DEVELOPMENT OF JINDAMANEE MEDICINE PRODUCTION USING MODERN DRUG PRODUCTION MODEL

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Abstract

Jindamanee is an ancient traditional Thai herbal formula that has been passed down since the Ayutthaya period. It was originally developed by Somdet Phra Phanarat. It is believed to be a panacea, capable of treating various serious illnesses, including those believed to be caused by bad karma. This study aimed to: Develop the Jindamanee formula into tablet form, develop a modern production process for Jindamanee tablets, and investigate the physical properties of the tablets in comparison with the pharmaceutical standards for tablet production. Six formulas were studied. The extraction of 1.43 kilograms of Jindamanee yielded 29.37% or approximately 420 grams. Upon tablet compression, six formulas were tested. It was found that formula 6 showed higher weights variable more than 7.5% which is above the standard 13.24% respectively. However, all formulas passed the thickness test and formula 2-3 showed the most consistent thicknesses were showed 5.37±0.07 and 5.44±0.27 respectively. Tablet hardness results indicated that formula 1 had the highest average hardness at 3.63±2.37 kp however all formulas doesn't pass tablet standard. All formulas passed the friability standard test, with formula 6 showing the lowest friability at 0.63%. The disintegration times for all formulas were within acceptable limits, with formula 2 performing best, disintegrating within 2±2.44 minutes. In conclusion, the next study focuses on developing a formula using modern technology and studying the stability of the compounds in Jindamanee medicine.

Keywords: Jindamanee, modern pharmaceutical production, traditional herbal medicine

Introduction

Drug development consists of a discovery phase, which is the foundational research stage, followed by preclinical development, clinical development, registration, and post-

registration phases. The development of various dosage forms falls within the foundational research stage up to the preclinical development phase. The objectives of this are to develop a drug that exhibits appropriate drug release and therapeutic effect, possesses stability, is safe, is acceptable to consumers, is cost-effective to manufacture, and is capable of production, scale-up, and accurate and precise batch-to-batch reproducibility. (Rattirod K., 2021)

Thai Traditional Medicine is a body of knowledge and wisdom inherited over many generations. It has a long history of practical application and proven efficacy, accumulated through extensive experience. This involves a process of seeking knowledge, practical experimentation, and refinement to suit the local culture and available herbal resources, both indigenous and those introduced by foreign traders. Furthermore, its effectiveness was evaluated, and the knowledge was recorded in ancient palm-leaf manuscripts, some of which still survive today. (Yongsuk T. and Ruangtip T., 2018)

Jindamanee Medicine (Yaa Wasana), also known as the Elixir of Fortune, is an ancient medicinal formula originating from Somdet Phra Phanarat of Wat Pa Kaeo in Ayutthaya. Inscribed in an antique Khoi (mulberry paper) manuscript, the text describes an extraordinarily intricate preparation method and its incredible Buddhanuphap (Buddha's divine power). Jindamanee Medicine is believed to possess the virtue to cure various severe illnesses, including those arising from negative karma. It is said that even a person near death, upon consuming this medicine, could have their lifespan extended, allowing them a chance to give final instructions to their descendants. Furthermore, it is believed to bestow immense power, fortune, and prestige, unparalleled by any other. This revered formula is recorded in a Khoi manuscript, inscribed with gold-leaf and cinnabar lacquer (Long Thong Long Chat), and is considered a priceless treasure of Wat Klang Bang Kaew. (Deenark, 2022)

Research Objectives

1. To develop the Jindamanee formula using modern technology.
2. To develop the Jindamanee production process using modern technology.
3. To study the physical properties of Jindamanee tablets compared to good tablet manufacturing standards.

Scope of Research

Population and Sample

1. In this study populations are Jindamanee medicine that has gone through the traditional manufacturing process 1,430 g

Variable scope

Independent variable

1. Jindamanee medicine crude extract weight
2. Characteristics of good tablets

Research time scope

April 2025 – November 2025

1. Research Methodology

1.1 Chemicals

Jindamanee crude extract and excipients including 95% ethanol (food grade; Vivastar, USA), corn starch (GPharmGel, China), talcum (CPharmGel, China),

microcrystalline cellulose (Avicel, China), sodium starch glycolate (Vivastar, USA), and magnesium stearate (Italy) were used in study

1.2 Materials

Beakers (Glassco, India), graduated cylinders (Glassco, India), sample storage bottles (Glassco, India), Erlenmeyer flasks (Glassco, India), round-bottom flasks (Glassco, India), glass stirring rods (Glassco, India), membrane filters (0.45 µm, 47 mm; Cichro, China), aluminum foil (Daimond, Thailand), spatulas (Thailand), and rubber gloves (Sri Trang, Thailand) were used in this study

1.3 Tools

An analytical balance with Four decimal places (Model TM-EXJ2204H, TOMS, Thailand); Ultrasonic cleaner (TRU-SWEEP™, NY, USA); Automatic tablet hardness tester (Model Easy Check, ERWEKA, Germany); Disintegration tester (Model TD-Series, Thermonik, China); Friability tester (Model CS-3, Thermonik, China); Rotary vacuum evaporator (Model RE100-S, Onilab, USA); Vacuum pump (Biobase, China); Rotary tablet press (Model ZP-17D, JINLU, China); and V-blender (Siam Center Green Tech, Thailand) were used in this study

2. Research Steps

2.1 Prepared of Jindamanee medicine extract

2.1.1 The powdered Jindamanee medicine (1,430 g) was mixed with 95% ethanol at a ratio of 1:5 (w/v) (5,000 ml). (Lipeng Shen, 2023) the mixture was extracted using an ultrasonic water bath for 30 minutes and repeated three times.

2.1.2 The extract was filtered through Whatman No. 1 filter paper to remove any residues. The combined extract was concentrated using a rotary vacuum evaporator to remove any remaining solvent until completely dry.

2.1.3 The dried Jindamanee extract was weighed, yielding 420 g.

2.2 Prepared granule of Jindamanee medicine extract

2.2.1 A portion of Jindamanee extract (350 g) was mixed with a suitable solvent and then blended with 1 kg of maltodextrin

2.2.2 The mixture was air-dried until the solvent completely evaporated at room temperature in pharmaceutical laboratory room, and the Jindamanee powder was thoroughly dried. The final weight of the dried powder was 1,230 g

2.3 Jindamanee tablet recipe

Six formulas of Jindamanee tablets were developed, each containing 200 mg of Jindamanee granules as the main active ingredient. The compositions of the excipients were varied among the formulas. By adjusting the excipients and the disintegrating agents in each formula to find the most suitable formula for tablet shape retention and tablet disintegration, formula 1 did not add sodium starch glycolate to study the hardness and disintegration of tablets without adding a disintegrant. Formulas 2-6 were adjusted to add a disintegrant and reduce the bulking agent to study the best disintegration time. The details of each formula are shown in Table 1.

Table 1: Details of each formula

Formulars	F1	F2	F3	F4	F5	F6
Jindamanee extract granule	200	200	200	200	200	200
Corn Starch	0	50	50	50	50	50
Talcum	20	20	20	20	20	20
Magnesium stearate	5	5	5	5	5	5
Sodium starch glycolate	0	5	10	15	20	25
Micro crystalline cellulose 102	275	220	215	210	205	200

2.4 Characteristics of Jindamanee tablet each formular

The physical properties of the Jindamanee tablets were evaluated in accordance with the standards specified in the United States Pharmacopeia (USP 32/NF 27, USP 33/NF 28) and the British Pharmacopeia (BP 2009), as described below:

2.4.1 Weight Variation

Ten tablets from each of the six formulas were randomly selected and individually weighed. The weight variable was calculated. The relative standard deviation (RSD) was then determined using the recorded tablet weights.

2.4.2 Friability

Ten tablets were randomly selected and gently cleaned with a soft brush to remove any adhering dust. The initial weight of the tablets was recorded, after which the tablets were tested for friability using a friability tester at a rotation speed of 25 rpm for 4 minutes. The tablets were then cleaned again and reweighed. If the weight loss was less than 1%, six formulas were considered to have passed the friability test. Tablets showing cracks or breakage were considered to have failed the test.

2.4.3 Tablet Thickness

Ten tablets from each formula were randomly selected. The thickness of each tablet was measured using a tablet thickness tester, and the results were recorded in millimeters (mm).

2.4.4 Tablet Hardness

Ten tablets from each formula were randomly selected. The hardness of each tablet was determined using a tablet hardness tester, and the results were expressed in kilogram-pound (kp).

2.4.5 Disintegration Time

Six tablets from each of the six formulas were randomly selected and tested for disintegration time using a disintegration tester. The temperature of the disintegration medium (water) was maintained at 37 °C. The disintegration time was recorded in minutes as the time required for the completed disintegration of each tablet. According to good tablet standards, the disintegration time should not exceed 30 minutes.

2.4.6 Data Analysis

In this study, the data were analyzed using descriptive statistics, including percentage (%), mean, and standard deviation (SD). The statistical analysis was done by one-way ANOVA with Tukey HSD to compare the differences between sample groups. The differences were significant at $p<0.05$. The results are presented in tables, accompanied by additional explanations to illustrate trends and differences in the measured parameters.

3. Research Results

3.1 Extract Yield

The extraction of Jindamanee medicine using 95% ethanol (food grade) yielded a thick, brown viscous extract after completed solvent evaporation. The percentage yield of the crude extract was 29.37%.

3.2 Weight Variation of Jindamanee Formulas

The weight of 10 tablets per batch was evaluated for each of the six formulas. The formula with the least weight variation was formula 2 and formula 5 is 2.85% all of 2 formulas, which falls within the acceptable range (<7.5%) according to pharmacopeial standards. In contrast, formula 6 showed higher weights variable more than 10% which is above the standard as 13.24%. From the comparison of the six formulas, it was found that formulas 2, 3 and 5 had no different Weight Variation values. When compared with formulas 1, 4 and 6, there was a statistically significant difference at 0.05. Shown in Table 2.

3.3 Tablet Thickness

The tablet thickness of each formula was measured in millimeters. Formula 2 showed exhibited the most uniform thickness with 5.37±0.07 mm, indicating consistent compression force and tablet size. While other formulas have SD values from shown wider thickness variation. From the comparison of six formulas, it was found that formulas 2-5 had no difference Tablet thickness value. When compared with formulas 1 and 6 there was a statistically significant difference at 0.05. Shown in Table 2.

3.4 Tablet Hardness

The tablet hardness was measured in kilopond (kp). Formula 4 had the lowest hardness, with an average of 2.59±1.32 kp, while formula 1 showed the highest average hardness at 3.63±2.37 kp. However, all formulas exhibited hardness values below the standard minimum of 4 kp for conventional tablets. Shown in Table 2 and figure 1.

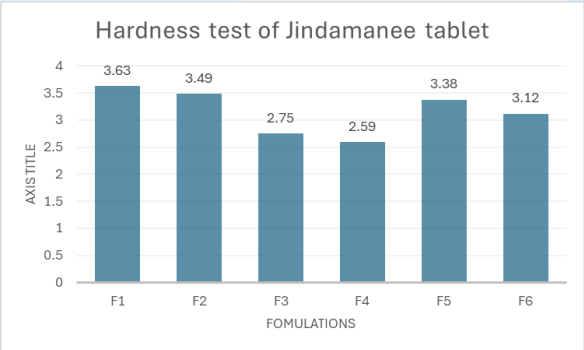

Figure 1: Hardness test of Jindamanee tablet

3.5 Friability

The friability of all six formulas was within the acceptable limit of less than 1.0%. Formula 6 had the lowest friability at 0.63%. Shown in Table 2 and figure 2.

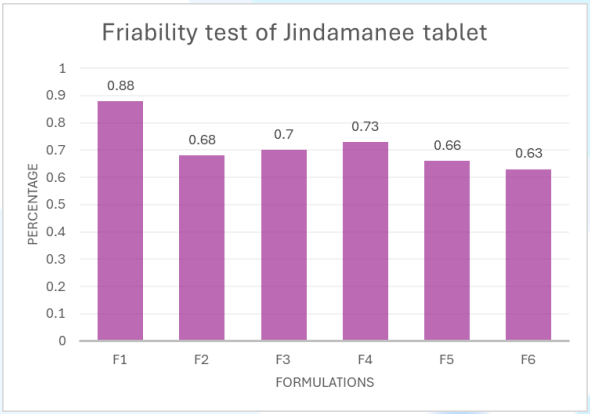

Figure 2: Friability test of Jindamanee tablet

3.6 Disintegration Time

The disintegration time was evaluated using six tablets per formula. Formulas 1, 2 and 5 disintegrated rapidly within 2±2.44, 2.34±0.81 and 2.5±3.67 minutes, which is considered excellent. In contrast, Formulas 3, 4 and 6 required more than 5 minutes for some tablets. But still met the pharmacopeial requirement of not exceeding 30 minutes. Shown in table 2 and figure 3.

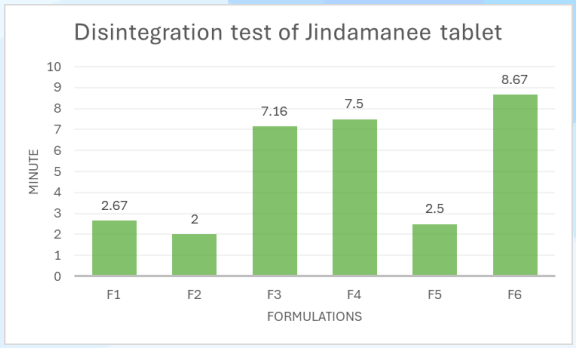

Figure: Disintegration test of Jindamanee Tablet

Table 2: Details Characteristics of Jindamanee tablet

Formula	Characteristics of Jindamanee tablet				
	Weight Variation (Percentage)	Friability (Percentage)	Thickness (Millimeter)	Hardness (Kilopond)	Disintegration Time (Minute)
Control	<7.5	<1	-	>4	<30
F1	7.29^{b}	0.88	5.22 ± 0.23^{c}	3.63±2.37	2.34±0.81
F2	2.85^{c}	0.68	5.37 ± 0.07^{b}	3.49±1.03	2±2.44
F3	3.41^{c}	0.70	5.47 ± 0.16^{b}	2.75±0.66	7.16±4.99
F4	4.63^{bc}	0.73	5.46 ± 0.22^{b}	2.59±1.32	7.5±3.67
F5	2.85^{c}	0.66	5.44 ± 0.27^{b}	3.38±0.84	2.5±3.67
F6	13.24^{a}	0.63	5.60 ± 0.23^{a}	3.12±0.65	8.67±3.26

Note: Control is standard, F are any formulas. Letters indicate the significant differences using one-way ANOVA with Tukey HSD. ($p = 0.05$)

4. Discussion

Development of the Jindamanee tablet using modern pharmaceutical manufacturing principles demonstrates that excipient composition and formula design significantly influence the physical properties and performance of the tablets. Extraction with 95% food-grade ethanol yielded 29.37%, which is considered acceptable for herbal formulas containing resins or highly viscous constituents. This yield indicates the efficiency of the extraction process, both in terms of solvent penetration and the preservation of heat-sensitive compounds.

The results of the tablet weight variation test showed that formulas F2 and F5 had the lowest variation at 2.85%, which falls within the pharmacopeial standard (<7.5%). This reflects good powder flow properties and consistent die filling during tablet compression. In contrast, formula F6 exhibited weight variation as high as 13.24%, presumably due to non-uniform powder distribution, segregation of the powder blend, or inconsistent filling during each compression cycle. These findings highlight the need to improve the granulation process or adjust the type of excipients to achieve better variation.

The tablet thickness values indicated that formula F2 exhibited the highest variation (5.37 ± 0.07 mm), which is presumed to result from consistent compression force and uniform particle size distribution. In contrast, formulas with higher standard deviations likely reflect differences in the density and elasticity of the granules during compression.

The tablet hardness results showed that all six formulas were below the minimum acceptable standard (4 kp). Although formula F1 had the highest average hardness (3.63 ± 2.37 kp), the overall hardness remained insufficient, which may be due to an inappropriate amount of binder or inadequate strength of the granules formed. However, the friability values for all formulas remained within the standard limit (<1%), indicating that despite the low hardness, the tablets still possessed acceptable resistance to abrasion and breakage during handling.

The disintegration test results showed that formulas F1, F2, and F5 disintegrated rapidly within approximately 2–2.5 minutes, reflecting an appropriate amount of disintegrant and a porous tablet structure, which facilitates the release of active compounds and may promote faster herbal efficacy. In contrast, formulas F3, F4, and F6 required more than 5 minutes. Although still within the official pharmacopeial limit (not exceeding 30 minutes), the longer disintegration times may indicate higher internal tablet cohesion, uneven distribution of the disintegrant, or excessively dense tablet structures.

From an industrial development perspective, tablet hardness and powder blend variation are key factors that need improvement for future production of Jindamanee tablets. Further studies should consider optimizing the proportion of excipients, employing wet granulation techniques, or applying particle engineering approaches to enhance compressibility and powder blend variation. Additionally, evaluating the pharmacological activity and product stability will support the advancement of traditional Thai medicine toward integration into modern pharmaceutical systems.

5. Conclusion

This study was a preliminary formula development of Jindamanee herbal tablets. The results showed that the hardness of all formulas was below the acceptable standard for conventional tablets (4 kp), likely due to an insufficient amount of binder, leading to weak tablet strength. Similarly, the delayed disintegration observed in some formulas may be due to the low amount of disintegrant and excessive compression force, which increased interparticle bonding and reduced disintegration efficiency. Further formula optimization, particularly with

respect to granulating agents, binder concentration, and disintegrant composition, is necessary to achieve tablets that meet standard pharmaceutical quality requirements.

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