Pharmacy Education (2024) 24(3) 358 - 362
https://doi.org/10.46542/pe.2024.243.358362

IGSCPS SPECIAL EDITION

RESEARCH ARTICLE

Testing the aphrodisiac effects of *Sterculia quadrifida* (faloak) bark powder on male white rats (*Rattus norvegicus*)

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Keywords
Aphrodisiac
Effect
Quality
Sterculia quadrifida

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Abstract

Background: *Sterculia quadrifida* R.Br has been widely known and, empirically, has been widely used as an herbal ingredient to overcome sexual disorders in men. **Objective**: This study aims to assess the quality, stability, and aphrodisiac properties of faloak bark solution preparations (from plants R.Br Sterculia quadrifida) found on Timor Island, specifically on male white rats of the Wistar strain. **Method:** This research is a type of experimental research. The activity test used two variations of the formula (50%, 100%) extract, positive and negative control tests. Data were analysed with one-way ANOVA ($p < 0.05$). **Result:** The test results of extract quality and stability, including moisture content, resting angle, flow speed, dissolving time, organoleptic test, pH, specific gravity, clarity, and homogeneity, met the requirements. The analysis results found significant differences in each test group ($p < 0.05$), and there were substantial differences between the negative control group and the positive control group, formula one and formula two. **Conclusion:** The preparation of the solution *of Sterculia quadrifida* R. met the established quality and stability. The results of the aphrodisiac test of the effect *of Sterculia quadrifida* R.Br on the parameters of introduction and climbing activity showed significant activity compared to the negative control group.

Introduction

Indonesian people have long used the surrounding natural resources as traditional medicine. This traditional medicine in Indonesia is known as *jamu*. Traditional medicine has good prospects and potential for development in the future. In addition to being readily available due to the accessibility of the raw materials, traditional medicine is generally safer and has relatively fewer effects than that of modern medicine (Hertiani *et al.*, 2019).

Medicinal plants with aphrodisiac properties are very common among men (Nimesh, 2016). Aphrodisiacs are ingredients that can increase stamina and libido or sexual desire (Kotta *et al.*, 2013). Plants that are efficacious as aphrodisiacs are physiologically able to facilitate blood circulation in the central nerve or peripheral blood circulation, which then stimulates blood circulation in the male genitals (Lee *et al.*, 2016). Various aphrodisiacs have the potential to improve erections, stimulate arousal centres in the brain, improve fitness, increase the production and performance of sex hormones, or be able to increase the blood flow capacity of the blood vessels that flow to the penis (Lim, 2017). Some plants which are known to have *aphrodisiac* benefits include ginseng from Korea (*Panax ginseng)* (Abdel-Wahhab *et al.*, 2014), *Eurycoma longifolia* Jack (Eurycoma *et al.)* (Rehman *et al.*, 2016), and *faloak bark (Sterculia quadrifida* R.Br*)* (Darojati *et al.*, 2022).

Faloak bark is one of the traditional medicinal plants that are efficacious as a medicine for men. Faloak bark (*Sterculia quadrifida* R.Br) (Winanta *et al.*, 2019), hereafter referred to as faloak, is a member of the genus *Sterculia*, a species of the Family Sterculiaceae that has not received attention. However, it has traditionally had potential as a medicinal ingredient

(Winanta *et al.*, 2019). Research proves that the bark of the herd trunk contains several compounds: alkaloids, flavonoids, terpenoids, and steroids. In other flock bark studies, the determination of flavonoid compound levels found a flavonoid content of 2.5 mg per 1 g of 96% alcohol extract of faloak bark (Siswadi & Saragih, 2017).

With the recent development of science, people want more practical things in everything, such as drug use, so research on dosage forms of drugs continues to be developed (Mohs & Greig, 2017). The preparation used in this study was syrup from instant faloak bark (*Sterculia quadrifida* R.Br). The advantage of syrup preparations is that they are quickly absorbed, so they quickly cause an effect (Handbook of pharmaceutical excipients, 2003). Besides being easy to use, syrup is also a concentrated preparation in water from sugar or sugar substitutes with or without adding fragrances and medicinal ingredients (Ernawati, 2021).

Some of the aphrodisiac studies that have been carried out include "*Test of the effect of spermatogenesis of dry preparations, instant extracts and syrups from pasak bumi root mixture (Eurycoma longifolia* Jack*.), java chilli fruit (Piper retofractum* Vahl*.), and red ginger rhizomes (Zingiber officinale* Rosc*.) against male white rats*", "*Test of aphrodisiac effects of star fruit extract (Avverhoa Bilimbi* L*.) in white rats wistar strain*" and "*Test of aphrodisiac effects of dry instant extract preparations and syrup preparations from purwoceng herb (Pimpinella alpina* K.D.S*.) against male white rats (Rattus novergicus) wistar strains*" (Nuryadin & Nabiila, 2018).

Method

Research design

This research is an experimental type. The samples used in this study were old, brown, and fresh faloak bark (*Sterculia quadrifida* R. Br), which came from Kupang Regency, East Nusa Tenggara Province, test animals used male white rats (*Rattus novergicus*). The data analysis was carried out using the one-way ANOVA method. The study protocol has been approved by the ethics committee of the Health Polytechnic of the Ministry of Health, Kupang, Indonesia (reference LB.02.03/1/0121/2022)

Assessment

The test stages carried out in the study included quality tests of instant powder drink preparations. The aphrodisiac effect in male rats (*Rattus novergicus*) was measured by calculating the frequency of the introduction phase and *climbing* activity in mice. Observation of the introduction and *climbing* activities of male white rats to female white rats was carried out after treatment within six days for the negative control treatment group as well as the positive control treatment group and the sample treatment group of faloak bark (*Sterculia quadrifida* R.Br) instant powder drink.

Data analysis

Data on the number of introduction and climbing activities were statistically analysed using a one-way ANOVA test with a significance level of 95% (α=0.05), followed by a post hoc Tukey HSD test to see significant differences.

Result

Stability and chemical content examination of flock rod powder

The phytochemical test indicated the bark of faloak stems contained flavonoids, steroids, terpenoids, saponins, tannins, and alkaloids (Table I).

Table I: Phytochemical profile of faloak (*Sterculia quadrifida* R.Br)

Parameters	Results	Standard
Organoleptic	The characteristic smell of the herd was a bitter taste, dark brown	
Phytochemical screening		
Flavonoids	+	Red, yellow, orange
Steroids	+	Green, bluish green, blue
Terpenoids	+	Brown or violet ring formed
Saponins	+	Formed froth persists for 10 minutes
Tannins	+	Blackish green/Blue
Alkaloids	+	Orange/red brown

Other parameters are tested on the instant powder, such as moisture content, flow properties, dissolving time, homogeneity test, dosage pH, displaced volume, clarity test, and density, have met the requirements set out in the literature (BSN, 1996; Lachman *et al.*, 1976; Rudolf Voight, 1994). The result is presented in Table II.

Table II: Faloak instant powder quality test results

Parameters	Results	Standard
Moisture test	0.83 ± 0.076	< 3%
Flow speed test	1.45± 0.78	< 10 seconds
Larut time	24.99 ± 0.763 seconds	< 5 minutes
Homogeneity test	Mixed particles	Homogeneous
pH instant powdered drink preparations	7.00	4-8
Volume transferred	100 %	95%
Clarity	Clarity	

Introduction and climbing activity

The introduction activity in this study was observed by counting the actions of male rats in kissing the mouth and neck and licking the genitals of female rats. Introduction activity is calculated 4 hours after administering the solution for six days, while the limitation of climbing activity is when the male mouse rides the female mouse from behind.

The number of introduction activities of male rats to female rats during 5 (five) observations in each group was averaged. Based on the data in Table III, in the Formula 1 group (50% w/v), the average introduction is 10.60 ± 2.168, and the average climbing is 10.40 ± 3.050 times. Introduction activity test results in the Formula 2 group (100% w/v) averaged 42.00 ± 10.271, while climbing averaged 22.00 ± 6.042.

Table III: Test results of aphrodisiac effects of *Sterculia quadrifida* R.Br on white male rats (*Rattus norvegicus*) in each treatment group

Treatment groups	Results*	One-way ANOVA test
Introduction activities		
Positive control (+)	57.80 ± 5.263	< 0.05
Negative control (-)	2.20 ± 0.837	
Formula 1 (50%)	10.60 ± 2.168	
Formula 2 (100%)	42.00 ± 10.271	
Frequency of climbing activities		
Positive control (+)	60.00 ± 4.000	< 0.05
Negative control (-)	2.40 ± 0.894	
Formula 1 (50%)	10.40 ± 3.050	
Formula 2 (100%)	22.00 ± 6.042	

*The results of this test show that each treatment is replicated five times for accuracy. Treatment includes control (+) with *Eurycoma longifolia* extract, negative control (-) with aquadest, formula 1 (50% w/ v *Sterculia quadrifida* R.Br), and formula 2 (100% *Sterculia quadrifida* R.Br).

The positive control formula provided the highest introduction and climbing activity compared to other groups, with an average number of introductions of 57.80 ± 5.263.

Discussion

Instant powdered drinks can be evaluated for their physical properties by testing pH, moisture content, flow time, and stationary angle (Lachman *et al.*, 1976; BSN, 1996). The pH test determines the level of acidity in the instant powder drinks (Peleg, 2007). The test results show that instant powder drinks have an average pH value of 7, meaning that they met the requirements set by quality standards and can be said to be safe for consumption (BSN, 1996). The moisture content test results met the quality requirements of 0.83, an excellent instant powder drink test requirement of no more than 3% (BSN, 1996). A moisture content test was performed to determine how much water the instant powder drink contained. High moisture content can cause physical instability of the product. The moisture content of instant powder drinks met the required standard (Ministry of Health, 2020; Ramadani *et al.*, 2023). The flow time test is carried out to determine the flow properties of instant powder drink preparations made by flowing several powders in a tool of 1.45 ± 0.78. The test results found that instant powder had a value that met the requirements, where the excellent powder flow time properties were less than 10 seconds (Lachman *et al.*, 1976). According to Adawiyah (2018), sugar is highly soluble in water, so the ability to dissolve instant powder will increase with a high sugar concentration. The soluble time of this instant seasoning powder drink belonged to the good instant powder seasoning drink category and met the requirements. Excellent dissolving time in instant powder drinks is less than five minutes.

The results showed that formulas 1 and 2 gave high results on increased introduction and climbing activities in male mice. Comparison of introduction and climbing activities between 50% (w/v) and 100% (w/v) concentrations also indicated significant differences. A higher concentration of the solution increased mice introduction and climbing activities.

The comparison of introduction activity between 100% and 50% concentrations to negative controls was significantly different because the negative controls did not contain aphrodisiac active substances that caused white rats not to undergo introduction.

Research conducted by Andini (2014) using *katuk* leaves showed that *katuk* leaves have aphrodisiac

effects because of their secondary metabolite (flavonoids, alkaloids, and saponins) contents. These compounds are also found in the bark of herd stems (*Sterculia quadrifida* R.Br) (Nuryadin & Nabiila, 2018). In *katuk* leaf research, flavonoid compounds and saponins increase testosterone hormone levels, while alkaloid compounds play a role in vasodilation. There was a significant difference in climbing activity in male white rats given 50% and 100% formulas compared to negative controls. The negative control did not contain *aphrodisiac active substances* that caused white rats not *to climb.*

Saponin compounds increase libido through the mechanism of direct action on the central nervous system and gonad (Jahromi *et al.*, 2022). Flavonoids increase testosterone and encourage sexual behaviour in men. Alkaloids have peripheral action, namely by helping to relax smooth muscles that trigger erections (Martin & Touaibia, 2020). This compound is also found in the bark of the faloak trunk (*Sterculia quadrifida* R.Br).

Conclusion

The quality and stability of instant powder drink *preparations Sterculia quadrifida* R.Br medicinal plants showed results that met the requirements in the test parameters. The potential of plants in administering aphrodisiacs using introduction parameters and climbing activities in the research showed significant aphrodisiac potential to be developed as herbal plants to overcome sexual dysfunction in men.

Acknowledgement

Thank you to the Department of Pharmacy, Health Polytechnic of the Ministry of Health Kupang, for granting permission to use the laboratory and all those who helped complete this research.

Funding sources

Health Polytechnic of the Ministry of Health in Kupang research programme.

References

Abdel-Wahhab, P. M., Joubert, O., el-nekeety, A., Park, M., Yoon, W., Kim, Y., & Rihn, B. (2014). Aphrodisiac effects of Panax ginseng extract standardized with ginsenoside Rg3 in male rats. *General Health Sciences and Medicine*, **1**, 3–8. https://www.semanticscholar.org/paper/Aphrodisiac-effects-of-Panax-ginseng-extract-with-3-ABDEL-WAHHAB-El%E2%80%90Nekeety/5b2c3ddb570e3adb2eddfa052bf6ab56a6392ad0

Andini, D. (2014). Potential of katuk leaves (Sauropus androgynus L. Merr) as aprodisiac. *Major*, **3**, 17–22.

BSN. (1996). *Traditional beverage powder standards*. National Standardization Agency. https://dokumen.tips/download/link/sni-01-4320-1996-serbuk-minuman-tradisional.html

Darojati, U. A., Murwanti, R., & Hertiani, T. (2022). Sterqulia quadrifida R.Br: A comprehensive review of ethnobotany, phytochemistry, pharmacology and toxicology. *Journal of Pharmaceutical Sciences and Clinical Research*, **7**(1), 1. https://doi.org/10.20961/jpscr.v7i1.52244

Rowe, R. C., Sheskey, P. J., & Weller, P. (Eds). (2003). *Handbook of pharmaceutical excipients, 4th edition*. American Pharmaceutical Association.

Hertiani, T., Purwantiningsih, Winanta, A., Sasikirana, W., Munawaroh, R., Setyowati, E. P., Murwanti, R., & Siswadi. (2019). Immunomodulatory and cytotoxic potential of in vitro Faloak (Sterculia quadrifida R.Br.) Skin. *Journal of Biological Sciences Online*, **19**(4). https://doi.org/10.3844/ojbsci.2019.222.231

Jahromi, A. R., Mosallanezhad, Z., Hosini, F. S., Jamali, S., & Sharifi, N. (2022). Effects of dates on sexual function in infertile couples: A double-blind controlled clinical trial. B.M.C. Research Notes, **15**(1), 55. https://doi.org/10.1186/s13104-022-05945-0

Ministry of Health of the Republic of Indonesia. (2017). *Indonesian herbal pharmacopoeia second edition*. https://farmalkes.kemkes.go.id/en/unduh/farmakope-herbal-indonesia-edisi-ii-tahun-2017/

Ministry of Health of the Republic of Indonesia. (2020). *Indonesian Pharmacopoeia (6th Edition)*. https://farmalkes.kemkes.go.id/2020/11/farmakope-indonesia-edisi-vi/

Kotta, S., Ansari, S. H., & Ali, J. (2013). Explore scientifically proven herbal aphrodisiacs. *Pharmacognosy Review*, **7**(13), 1–10. https://doi.org/10.4103/0973-7847.112832

Lachman, L., Lieberman, H. A., & Kanig, J. L. (1976). T*he theory and practice of industrial pharmacy (2d edition)*. Lea & Febiger.

Lee, J. K. C., Tan, R. B. W., & Chung, E. (2016). Erectile dysfunction treatment and traditional medicine—Can Eastern and Western medicine coexist? *Translational Andrology and Urology*, **6**(1). https://tau.amegroups.org/article/view/12802v

Lim, P. H. C. (2017). Asian herbs and aphrodisiacs are used to administer E.D. *Translational Andrology and Urology*, **6**(2), 167–175. https://doi.org/10.21037/tau.2017.04.04

Martin, L. J., & Touaibia, M. (2020). Increased testicular steroidogenesis uses flavonoids and isoflavonoids for the prevention of late-onset male hypogonadism. *Antioxidants*

(Basel, Switzerland), **9**(3), 237. https://doi.org/10.3390/antiox9030237

Mohs, R. C., & Greig, N. H. (2017). Drug discovery and development: The role of basic biological research. *Alzheimer's & Dementia (New York, NY)*, **3**(4), 651–657. https://doi.org/10.1016/j.trci.2017.10.005

Nimesh, S., Shubham, Ashwlayan, W. D., & Barman, P. (2016). Medicinal plants as aphrodisiac agents: Current status. *Advances in Pharmacology & Clinical Trials*, **4**(3), 00160. https://doi.org/10.23880/APCT-16000160

Nuryadin, E., & Nabiila, A. (2018). Development of industrial potential of purwoceng plant scale (Pimpinella pruatjan Molk or Pimpinella alpine Kds) using in-vitro culture techniques by rooting induction. J*ournal of Tropical Biodiversity and Biotechnology*, **3**(3), 92. https://doi.org/10.22146/jtbb.38849

Peleg, M. (2007). Flowability of food powders and methods for their evaluation–A review. *Journal of Food Process Engineering*, **1**(4), 303–328. https://doi.org/10.1111/j.1745-4530.1977.tb00188.x

Fitri, N. R., & Siswanto, A. P. (2023). Combination formulation of instant powder drink of red ginger and banana peel. *Materials Today: Proceedings*, **87**(2), 101–105. https://doi.org/10.1016/j.matpr.2023.02.379

Rehman, S. U., Choe, K., & Yoo, H. H. (2016). Reviews on traditional herbal medicine, Eurycoma longifolia Jack (Tongkat Ali): Traditional uses, chemistry, pharmacology and evidence-based toxicology. *Molecules (Basel, Switzerland)*, **21**(3), 331. https://doi.org/10.3390/molecules21030331

Rudolf Voight. (1994). *Pharmaceutical technology Textbook*. Gadjah Mada University Press.

Siswadi, S., & Saragih, G. (2017). Total flavonoid content of bark of some families of Sterculiaceae Faloak (Sterculia quadrifida R.Br.), pterigota (Pterygota alata (Roxb.) R. Br.) and nitas (Sterculia foetida L.). *National Seminar Proceeding TOI 52th*. https://doi.org/10.5281/zenodo.4085025

Winanta, A., Hertiani, T., Purwantiningsih, & Siswadi, S. (2019). In vivo Immunomodulatory Activity of Faloak Skin Extract (Sterculia quadrifida R.Br). *Pakistan Journal of Biological Sciences*, **22**(12), 590–596. https://doi.org/10.3923/pjbs.2019.590.596