E-BOOK OF EXTENDED ABSTRACT

THE 14TH INTERNATIONAL INVENTION, INNOVATION & DESIGN COMPETITION 2025

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ANDROGRAPHIS PANICULATA INTIMATE WASH FORMULATION (ANDROFEM)

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ABSTRACT

This study focuses on AndroFem, an intimate wash made using *Andrographis paniculata*, a medicinal plant known for its antimicrobial properties. The intimate wash includes natural ingredients such as peppermint oil, mild surfactants, and safe preservatives. Antimicrobial tests showed that AndroFem effectively kills harmful vaginal pathogens such as *Neisseria gonorrhoeae*, *Escherichia coli*, *Candida albicans* and *Streptococcus agalactiae* while supporting beneficial microbiota, *Lactobacillus crispatus*. It was also found to be non-toxic, chemically stable, and free from microbial contamination, making it safe for long-term use. Overall, it demonstrates potential as a natural and effective alternative to existing intimate hygiene products.

Keywords: A. paniculata, intimate wash, antimicrobial, toxicity

1. INTRODUCTION

Maintaining vaginal health is crucial for preventing infections such as bacterial vaginosis, vulvovaginal candidiasis (VVC), sexually transmitted infections, and urinary tract infections (Donders & Sobel, 2017; Flores-Mireles et al., 2015; Unemo et al., 2016). Vaginal infections caused by pathogens such as *C. albicans*, *N. gonorrhoeae*, *E. coli*, and *S. agalactiae* continue to be a health concern. The risk factors of the infections include multiple sexual partners, antibiotic use, smoking, and douching (Khedkar & Pajai, 2022). VVC, often caused by *C. albicans*, results in odourless, white, curd-like discharge and discomfort, commonly during reproductive years, and may be triggered by pregnancy, uncontrolled diabetes, or recent antibiotic use (Chen et al., 2017; Sobel, 2016). Commercial intimate washes are widely used for hygiene. However, many washes also contain synthetic chemicals that can irritate the vaginal mucosa and disturb the natural microbiota (Murina et al., 2020), particularly *Lactobacillus* spp., which play a key role in maintaining vaginal pH and preventing pathogen overgrowth (Chee et al., 2020). With interest in natural alternative growth, *A. paniculata*, a medicinal herb with proven antimicrobial properties, presents a promising solution. *A. paniculata* is known for its broad-spectrum antimicrobial, anti-inflammatory, and antioxidant properties attributed mainly to andrographolide (Okhuarobo et al., 2014). The formulated intimate wash, namely AndroFem, incorporates *A. paniculata* extract alongside natural-friendly ingredients, including peppermint oil (fragrance), potassium sorbate and sodium benzoate (preservatives), Tween 20 (solubiliser), deionised water (solvent), and surfactants such as sodium coco-glucoside tartrate, cocamidopropyl betaine, and sodium cocoyl hydrolysed wheat protein. Therefore, this study aims to formulate and evaluate AndroFem, by assessing its antimicrobial activity, cytotoxicity, heavy metal content, and formulation stability to ensure both safety and efficacy for potential vaginal use.

2. METHODOLOGY

A. paniculata extract was obtained through maceration method and incorporated into an intimate wash formulation with natural surfactants, preservatives, and peppermint oil. Pathogenic strains (*C. albicans,*

N. gonorrhoeae, E. coli, S. agalactiae) and a beneficial microbiota (*L. crispatus*) were cultured and tested. Antimicrobial activity was assessed by using disc diffusion, agar well diffusion, and broth microdilution method is also used to determine the minimum inhibitory concentration (MIC) and the minimum bactericidal concentration (MBC) values. Cytotoxicity was evaluated using the brine shrimp lethality assay, and heavy metal content was analysed by AAS. A stability study was conducted at 40°C and 75% relative humidity over 12 months interval storage, observing physical characteristics and sterility using the drop plate method.

3. FINDINGS

Table 1 Antimicrobial Activity, MIC and MBC Values against selected Vaginal Pathogens

Pathogens	Antimicrobial activity of SebaMed® feminine wash (control)	Antimicrobial activity of *A. paniculata* crude extract	Antimicrobial activity of *A. paniculata* intimate wash	MIC and MBC (mg/ml) of *A. paniculata* intimate wash
C. albicans	Strong inhibition	Moderate inhibition	Strong inhibition	3.125 (MIC), 1.563 (MBC)
N. gonorrhoeae	Strong inhibition	Moderate inhibition	Strong inhibition	<0.0015 (MIC), 0.781 (MBC)
E. coli	Moderate inhibition	Mild inhibition	Mild inhibition	3.125 (MIC & MBC)
S. agalactiae	Moderate inhibition	Moderate inhibition	Moderate inhibition	<0.0015 (MIC), 0.781 (MBC)
L. crispatus	Not tested	Not tested	No inhibition (preserved)	—

*Notes: ≤10 mm indicates mild inhibition, 11 - 15 mm indicates moderate inhibition, ≥16 mm indicates strong inhibition

Table 2 Cytotoxicity and Heavy Metal Safety Assessment of *A. paniculata* Intimate Wash

Test	Result	Safety Conclusion
Arsenic (As)	Not detected	Safe
Cadmium (Cd)	Not detected	Safe
Lead (Pb)	Not detected	Safe
Mercury (Hg)	Not detected	Safe
Brine Shrimp Test	No deaths up to 156 µg/ml LC_{50} = 7254.948 µg/ml	Safe at normal use levels Toxic only at very high dose

Table 3 Stability of *A. paniculata* Intimate Wash over Time Intervals

Time (months)	Colour	Smell	pH	Texture	Sterility
Fresh	Green	Peppermint	3.7	Clear	Sterile
3	Green	Same	3.8	Clear	Sterile
6	Slight brown	Same	3.7	Clear	Sterile
9	Amber	Same	3.8	Clear	Sterile
12	Light amber	Same	3.8	Clear	Sterile

4. CONCLUSION

A. paniculata intimate wash demonstrated strong antimicrobial activity against common vaginal pathogens, including *C. albicans*, *N. gonorrhoeae*, and *S. agalactiae*, while preserving the beneficial microbiota, *L. crispatus*. Its MIC indicates effective pathogen suppression at low doses. Safety tests also confirmed that the intimate wash is free from harmful heavy metals and non-toxic at normal usage levels, showing toxicity only at extremely high concentrations. Stability testing showed that the product maintains its physical properties, pH, and sterility for at least 12 months under accelerated storage conditions, with only scent changes over time. These findings thus support the intimate wash as a safe, stable, and effective option for female intimate hygiene.

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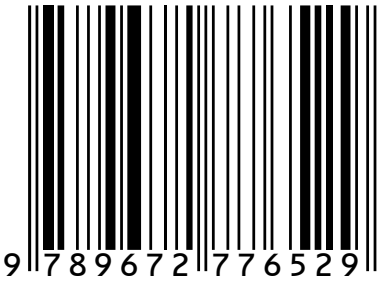

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