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SELECTED HERBAL GALACTAGOGUES IN INDONESIAN POSTPARTUM CARE: A NARRATIVE REVIEW INTEGRATING PRODUCT STANDARDIZATION, MATERNAL FACTORS, AND INFANT OUTCOMES

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Abstract

Herbal galactagogues are widely used during the postpartum period, but evidence should be interpreted at the level of a defined preparation rather than a plant name alone. This narrative review integrates natural-product science, obstetrics, and pediatrics to examine Moringa oleifera (kelor), Phyllanthus androgynus (syn. Sauropus androgynus; katuk), and Coleus amboinicus (syn. Plectranthus amboinicus; torbangun). A targeted literature search prioritized recent systematic reviews, clinical trials, cohort studies, and phytochemical studies, while retaining selected landmark evidence. Clinical findings suggest preparation-specific signals of benefit, but differences in botanical identity, processing, dose, postpartum timing, lactation phenotype, and outcome measurement limit generalization. Natural-product evaluation requires authenticated material, reproducible preparation, chemical fingerprinting, and contaminant control. Maternal assessment should identify obstetric and metabolic contributors to delayed lactogenesis, while pediatric assessment should verify milk transfer, hydration, growth, jaundice risk, and possible exposure-related adverse events. We propose a preparation-specific mother-infant dyad framework in which herbal products are considered only as monitored adjuncts after modifiable causes of low milk production or transfer are addressed. This framework provides a more reproducible and clinically interpretable basis for future Indonesian galactagogue research.

INTRODUCTION

Breastfeeding is a dynamic biological process in which maternal endocrine readiness, effective and repeated milk removal, and infant feeding competence must converge. Concerns about milk supply are common and can contribute to early supplementation or cessation of breastfeeding, yet perceived insufficient milk, delayed secretory activation, ineffective milk transfer, and established low milk production are not interchangeable clinical states (Segura-Perez *et al.*, 2022; Pados & Camp, 2024). A botanical product should therefore not be evaluated before the underlying lactation phenotype has been defined.

Postpartum use of foods and herbs intended to support lactation is common across cultures. In Indonesia, kelor, katuk, and torbangun are especially relevant. Current taxonomic references accept *Moringa oleifera* Lam., *Phyllanthus androgynus* (L.) Chakrab. & N.P.Balakr. for katuk (with *Sauropus androgynus* (L.) Merr. as a synonym), and *Coleus amboinicus* Lour. for torbangun (with *Plectranthus amboinicus* (Lour.) Spreng. as a synonym) (Plants of the World Online, 2026a; 2026b; 2026c). The use of accepted names matters because natural-product evidence must link the clinical intervention to a traceable botanical identity.

Recent evidence illustrates why a species name alone is insufficient. A 2022 placebo-controlled trial of *M. oleifera* capsules found no statistically significant difference in day-3 milk volume, whereas a 2025 pilot cluster-randomized trial using a much larger food dose of Moringa powder for three months found higher 24-hour expressed milk output (Fungtammasan & Phupong, 2022; Attia *et al.*, 2025). Recent systematic syntheses also describe a favorable signal for Moringa while emphasizing heterogeneity and the need for stronger safety and dosing evidence (Ammar *et al.*, 2025; Cragg *et al.*, 2026). These results should not be treated as interchangeable tests of a single intervention.

The novelty of this review is therefore not a claim that selected plants are universally effective galactagogues. Instead, we propose a preparation-specific mother-infant dyad framework that integrates three questions: What exactly was administered? What maternal condition explains low or at-risk milk production? Did the infant receive an adequate and safe nutritional benefit? This framing aligns natural-product standardization with obstetric assessment and pediatric outcomes, creating a clinically interpretable bridge between traditional use and contemporary evidence.

LITERATURE SEARCH AND REVIEW APPROACH

A targeted narrative literature search was conducted and updated through 17 August 2026. PubMed and Google Scholar were used to identify peer-reviewed literature, supplemented by backward reference checking. Search concepts combined terms related to galactagogues, breastfeeding, human milk, lactation insufficiency, delayed lactogenesis, *Moringa oleifera*, Phyllanthus/*Sauropus androgynus*, Coleus/*Plectranthus amboinicus*, postpartum hemorrhage, cesarean birth, infant growth and safety, phytochemical standardization, HPLC, and LC-MS. Plants of the World Online was consulted for accepted botanical nomenclature, and the Drugs and Lactation Database (LactMed) was used as a current evidence source for lactation-related safety and clinical summaries.

Priority was given to systematic reviews, randomized or controlled clinical studies, cohort studies, and analytical phytochemical studies published from 2022 to August 2026. Older studies were retained only when they represented landmark direct evidence that remained important for interpreting a specific Indonesian preparation, such as the early clinical study of torbangun. Because this is a narrative rather than systematic review, the search was intended to support critical interdisciplinary synthesis and was not designed for exhaustive study capture, meta-analysis, or formal certainty grading. The final narrative synthesis cited 26 sources, comprising peer-reviewed clinical, review, and related biomedical or phytochemical literature together with current taxonomic and lactation-safety reference resources.

LACTATION INSUFFICIENCY: CLINICAL PHENOTYPES AND POINTS FOR INTERVENTION

Secretory activation, often termed lactogenesis II, is generally considered delayed when the onset of copious milk production occurs more than approximately 72 hours after birth. Contemporary reviews confirm that delayed lactogenesis is multifactorial rather than a single prolactin-deficiency problem. Factors repeatedly associated with delay include maternal overweight or obesity, gestational metabolic disease, cesarean birth,

parity, maternal illness, sleep or psychosocial factors, and breastfeeding frequency or support, although the strength of individual associations varies across populations (Segura-Perez *et al.*, 2022; Li *et al.*, 2024; Peng *et al.*, 2024).

A practical assessment should first distinguish perceived low supply from physiologically inadequate production. Maternal concern may arise from cluster feeding, soft breasts, reduced leakage, or low pumping yield even when infant transfer and growth are adequate. Conversely, true insufficiency can reflect delayed secretory activation, insufficient glandular tissue, endocrine or metabolic disease, severe postpartum illness, or inadequate breast stimulation. Early and frequent milk removal and skilled lactation support remain foundational interventions for protecting milk supply (Pados & Camp, 2024).

The infant side of the dyad is equally important. Late-preterm birth, neurologic or cardiorespiratory disease, oral-motor dysfunction, severe jaundice, illness, or ineffective latch can reduce milk transfer. In this setting, persistent infant hunger may be interpreted as low maternal production when the dominant problem is access to milk already present. Research that measures only expressed milk volume therefore risks misclassifying a transfer problem as a production problem.

Within the framework proposed in this review, an herbal galactagogue is considered only after correctable maternal and infant contributors have been addressed, effective and sufficiently frequent milk removal has been established, and supplementation is provided when medically indicated without abandoning breast stimulation. Figure 1 summarizes this sequence. The framework is intended to support clinical reasoning and research design rather than serve as a stand-alone treatment guideline.

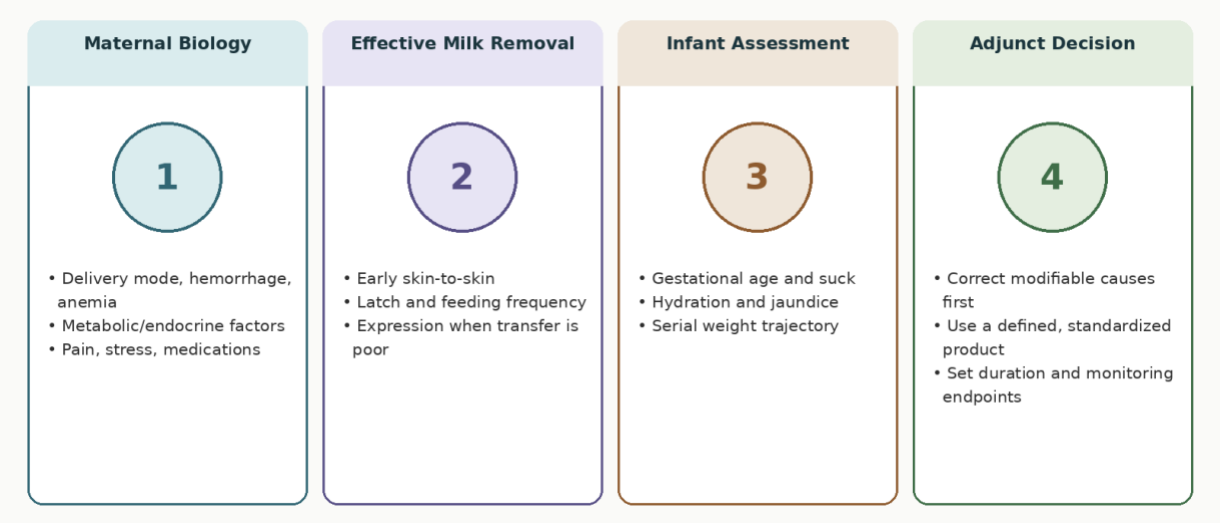

Figure 1. Clinical framework for lactation insufficiency before considering herbal galactagogues

COMPARATIVE CLINICAL EVIDENCE FOR SELECTED GALACTAGOGUES

The key clinical studies differ substantially in formulation, dose, comparator, postpartum window, and outcome measurement. Table I therefore presents the interventions as preparation-specific exposures rather than treating all products derived from the same species as equivalent. This distinction is central to interpreting both efficacy and safety.

Table I. Comparative clinical evidence for selected herbal galactagogue preparations

Preparation / source	Design and population	Dose / duration	Main maternal-infant findings	Interpretation and limitations
M. oleifera leaf capsules (Fungtammasan & Phupong, 2022)	Double-blind placebo-controlled RCT; 88 early-postpartum women	900 mg/day; early postpartum; primary milk-volume assessment on day 3	Median day-3 milk volume was not significantly different from placebo, although the Moringa group was numerically higher; no serious short-term maternal or neonatal adverse effect signal was reported	A rigorous design, but short exposure and early postpartum physiology limit conclusions about sustained lactation benefit
M. oleifera dried leaf powder in porridge (Attia *et al.*, 2025)	Pilot single-blinded cluster-randomized trial; 50 breastfeeding mother-infant pairs in Kenya	20 g/day for 3 months	Higher 24-hour expressed milk output at 3 months in the Moringa group; maternal and infant biomarkers and growth were also assessed	Important dyad outcomes, but small pilot sample and participants were not selected specifically for confirmed low milk supply
Polyherbal decoction containing *P. androgynus* + *C. amboinicus* + papaya versus commercial katuk extract (Zulkarnain *et al.*, 2024)	Open-label randomized controlled trial; 120 postpartum women with perceived low supply	Decoction: 25 g katuk + 10 g torbangun + 5 g papaya; comparator: 500 mg katuk extract; 28 days	Milk volume and infant weight increased over follow-up in both active groups; no clear superiority of one active preparation; liver enzymes were monitored	No placebo/no-treatment arm and mixed botanicals prevent causal attribution to a single plant; normal postpartum progression may contribute to within-group increases
C. amboinicus leaf soup (Damanik *et al.*, 2006)	Older randomized comparative study; 67 healthy lactating women	Soup prepared from 150 g leaves, 6 days/week for 30 days	Milk volume increased during the intervention and breast-milk nutritional quality was not reported to decline	Landmark Indonesian evidence but older methodology, baseline imbalance, limited product standardization, and limited reporting of standardized lactation support reduce certainty

Note: RCT = randomized controlled trial. Botanical names follow current accepted nomenclature; older study titles may use historical synonyms. The table summarizes key evidence rather than representing an exhaustive systematic evidence grade.

This comparison exposes a recurring reasoning error in galactagogue research: an increase over time within an intervention group is not by itself proof of a pharmacologic effect, because milk production normally changes rapidly during early postpartum recovery. The Zulkarnain trial is informative as a comparison of two active Indonesian preparations, but its design cannot isolate a single botanical effect. Likewise, the two Moringa trials cannot be treated as contradictory because they tested markedly different doses, formulations, populations, and postpartum windows (Fungtammasan & Phupong, 2022; Attia *et al.*, 2025).

THE NATURAL-PRODUCT PERSPECTIVE: BOTANICAL IDENTITY, PHYTOCHEMISTRY, AND STANDARDIZATION

For a natural-product scientist, the words "Moringa," "katuk," or "torbangun" are incomplete descriptions of an intervention. Species identity, plant part, geographic source, developmental stage, harvest conditions, post-harvest drying, particle size, extraction solvent, drug-extract ratio, storage, and final dosage form can alter the chemical profile delivered to the mother. Current taxonomic verification is therefore the first step, followed by documentation sufficient to reproduce the tested preparation (Plants of the World Online, 2026a; 2026b; 2026c).

Moringa oleifera illustrates why chemical characterization matters. Contemporary LC-MS work has demonstrated a chemically diverse leaf metabolome with multiple flavonoid families, while process-optimization research shows that cultivation, harvest, and extraction conditions affect the composition of flavonoid-rich Moringa preparations (Silva *et al.*, 2022; Ndou *et al.*, 2023). These compounds should not automatically be labeled as proven lactogenic actives. Their immediate value in a clinical trial is analytical: a chromatographic fingerprint or marker panel allows investigators to determine whether two preparations are chemically comparable before comparing outcomes.

Phyllanthus androgynus requires particular attention to dose and preparation. HPLC-DAD analysis of dried leaf extracts has identified ascorbic acid, phenolic acids, and multiple flavonoids, with substantial differences according to extraction solvent (Purba & Paengkoum, 2022). Current LactMed evidence also emphasizes that human galactagogue studies have important design limitations and that excessive ingestion of fresh *S. androgynus* leaves has been associated historically with severe bronchiolitis obliterans; customary cooked intake should therefore not be assumed equivalent to high-dose fresh or concentrated preparations (LactMed, 2025). This safety history is a strong argument for preparation-specific, rather than species-wide, benefit-risk assessment.

Coleus amboinicus provides a similar standardization challenge. Recent UHPLC-MS/MS work demonstrated that leaf developmental stage changes the chemical profile of hydroethanolic extracts, including variation in phenolic acids and flavonoids (Pinheiro *et al.*, 2023). Current LactMed review describes only limited-quality human evidence for a galactagogue effect and notes that direct data on transfer of Coleus constituents into human milk and infant safety remain lacking (LactMed, 2026a). Traditional use is therefore valuable evidence of cultural practice, but it does not replace product characterization or contemporary safety surveillance.

A minimum natural-product dossier for a galactagogue trial should include an authenticated accepted species name and plant part; voucher specimen or traceable reference material; source and harvest conditions; post-harvest handling; exact preparation or extraction procedure; dose in reproducible units; chromatographic fingerprint and selected marker specifications where feasible; and microbiological, heavy-metal, pesticide, and adulterant controls appropriate to the dosage form. Figure 2 shows the resulting plant-to-clinic chain.

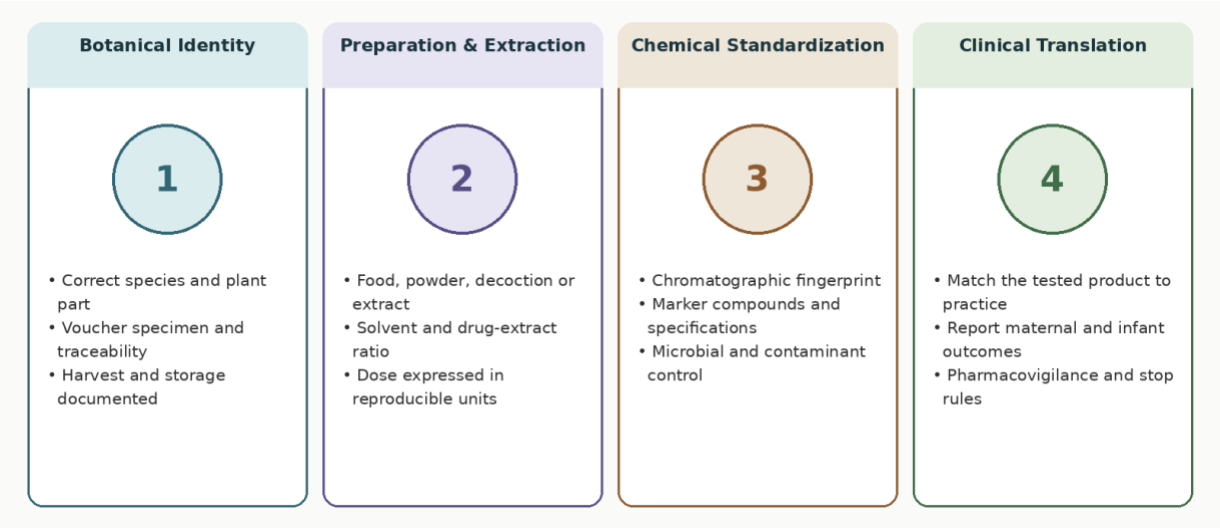

Figure 2. Natural-product quality chain required for clinically interpretable galactagogue evidence

THE OBSTETRIC PERSPECTIVE: MATERNAL CAUSES OF DELAYED LACTOGENESIS AND SAFE ADJUNCT USE

The postpartum mother should not enter an adjunct pathway before clinically relevant obstetric contributors to delayed lactogenesis have been considered. Cesarean delivery is associated with a higher prevalence of delayed lactogenesis, but the pathway is not simply surgical: primiparity, low feeding frequency, maternal

nutritional or metabolic status, psychological distress, and delayed or difficult early feeding may coexist (Lian *et al.*, 2022; Peng *et al.*, 2024). The practical implication is not that a woman after cesarean birth needs an herbal product, but that she may need earlier and more active support to establish effective milk removal.

Postpartum hemorrhage is another important maternal context. Population-level data show that women experiencing postpartum hemorrhage, particularly severe hemorrhage, have greater difficulty establishing exclusive breastfeeding at discharge, and more recent follow-up data suggest an association with shorter exclusive breastfeeding duration (Flood *et al.*, 2023; Boyles *et al.*, 2025). Potential contributors include maternal instability, anemia, fatigue, separation, delayed initiation, and the broader physiological and psychological burden of hemorrhage. A mother with ongoing hemodynamic compromise, severe anemia, or symptoms suggesting endocrine or other postpartum pathology requires medical evaluation rather than empirical escalation of a galactagogue.

Metabolic and endocrine factors also matter. Recent syntheses identify overweight or obesity, gestational diabetes, thyroid disease, hypertensive disorders, and selected markers of maternal nutritional status among factors associated with delayed lactogenesis, although not all associations are consistent across studies (Segura-Perez *et al.*, 2022; Li *et al.*, 2024; Peng *et al.*, 2024). A supplement cannot correct the entire pathway linking insulin resistance, inflammation, endocrine signaling, delivery complexity, pain, sleep disruption, and feeding mechanics.

Within the proposed framework, maternal assessment before adjunct use includes recovery from bleeding and delivery, clinically indicated assessment of anemia, suspicion of retained placental tissue or endocrine disease when symptoms warrant, breast surgery or anatomic factors, pain control, concurrent medicines, sleep and stress, and the frequency and effectiveness of feeding or expression. If an herbal product is subsequently chosen, the exact product, dose, frequency, start date, intended duration, and maternal adverse events should be documented. Undefined high-dose raw preparations deserve particular caution, especially for katuk because preparation and dose materially influence risk (LactMed, 2025).

THE PEDIATRIC PERSPECTIVE: INFANT MILK TRANSFER, GROWTH, EXPOSURE, AND SAFETY

For pediatrics, the clinically meaningful endpoint is not simply "more milk" but adequate and safe nutrition of the infant. Expressed milk volume is useful in research, yet it is not identical to milk transfer during direct breastfeeding. Pump response differs among mothers, and an infant with ineffective suck may receive less milk than a pump can remove. Infant-centered outcomes such as feeding effectiveness, hydration, serial weight trajectory, and need for medically indicated supplementation should therefore accompany maternal milk-volume outcomes (Meek & Noble, 2022; Pados & Camp, 2024).

Early pediatric assessment includes gestational age, birth weight, delivery course, oral and neurologic feeding function, latch and swallowing, feeding frequency, urine and stool patterns, jaundice, and clinical risk of hypoglycemia or dehydration. Serial weight is more informative than a single measurement because expected physiological change depends on postnatal age and clinical context. When intake is inadequate, infant safety takes priority while maternal lactation is supported.

Herbal exposure also reaches the pediatric domain even when the product is taken only by the mother. Transfer data for many botanical constituents remain sparse. A Moringa study that examined maternal and infant nutritional biomarkers and milk carotenoids illustrates why a botanical intervention should be studied as a dyad exposure rather than only as a maternal outcome (Attia *et al.*, 2024). Current LactMed summaries for Moringa, katuk, and torbangun similarly emphasize that long-term infant benefit or direct milk-transfer data are incomplete, despite the absence of major short-term safety signals for some preparations (LactMed, 2025; LactMed, 2026a; LactMed, 2026b).

Within the proposed monitoring framework, new vomiting or diarrhea, rash, unusual irritability or sedation, respiratory symptoms, worsening jaundice, poor feeding, reduced urine output, or failure of expected weight recovery may warrant reassessment of both the infant and the maternal intervention. These are proposed safety triggers rather than plant-specific adverse effects expected from the three botanicals reviewed here. Their purpose is to prevent a methodological blind spot in which maternal tolerance is treated as proof of infant safety.

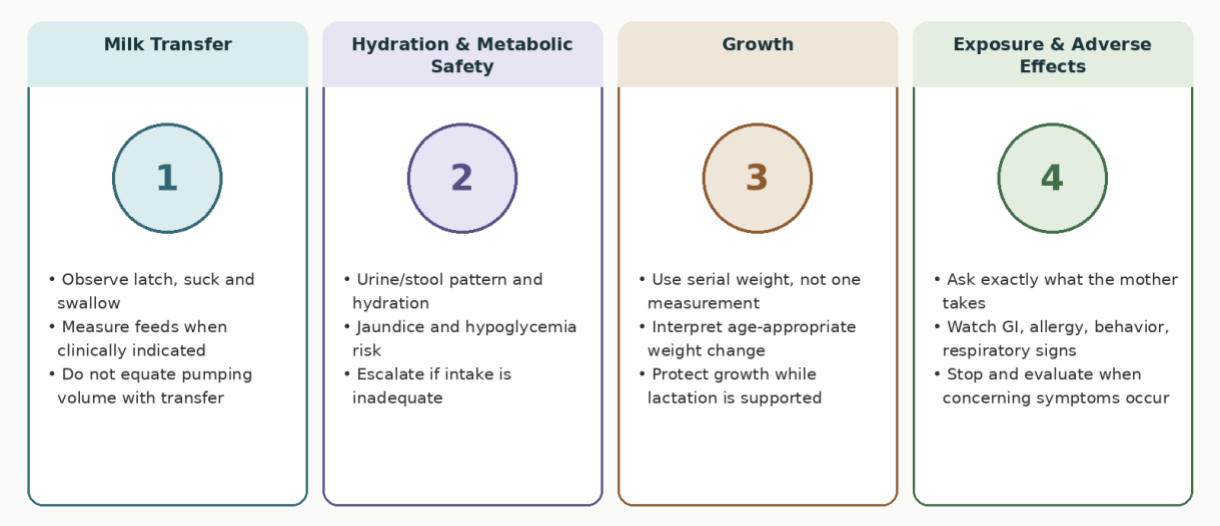

Figure 3. Pediatric monitoring of the breastfed infant during maternal herbal galactagogue use

INTEGRATED MOTHER-INFANT DECISION PATHWAY

The three disciplinary perspectives can be translated into one preparation-specific pathway. Step 1 is to verify the phenotype: perceived low supply, delayed secretory activation, inadequate transfer, or established low production. Step 2 is to correct reversible maternal and infant causes and establish effective milk removal. Step 3, if low production persists and the mother prefers an herbal option, is to select a preparation whose botanical identity, formulation, dose, and quality can be described. Step 4 is a time-limited monitored adjunct trial with prespecified maternal and infant outcomes. Step 5 is to continue, modify, or discontinue the intervention according to measured benefit and safety rather than tradition or expectation alone.

Within this model, the natural-product pharmacist or scientist is responsible for botanical identity, formulation logic, standardization, interaction screening, and pharmacovigilance documentation. The obstetrician evaluates postpartum recovery and maternal conditions that can impair secretory activation,

while the pediatrician verifies milk transfer, nutritional adequacy, growth, and infant safety. The value of the collaboration lies precisely in preventing one discipline from treating its endpoint as the entire clinical problem.

This framework also sharpens research design. A positive trial should be able to answer three questions: What exactly was administered? Why did enrolled mothers have low or at-risk milk production? Did the infant receive a clinically meaningful and safe benefit? If any one of these questions remains unanswered, the result is difficult to reproduce, translate, or use for product-specific recommendations.

CURRENT CHALLENGES & FUTURE DIRECTIONS

The strongest limitation in current herbal galactagogue evidence is heterogeneity. Studies differ in postpartum timing, baseline lactation status, lactation support, botanical preparation, dose, duration, milk-volume measurement, and infant outcomes. Recent reviews of Moringa and herbal galactagogues describe encouraging signals but also short treatment periods, variable risk of bias, and limited certainty for safety and sustained infant benefit (Ammar *et al.*, 2025; Cragg *et al.*, 2026).

Future Indonesian research should combine pharmacognostic and clinical rigor from the start. Botanical materials should be authenticated and fingerprinted before randomization; a stable preparation and dose should be selected; eligibility should define the lactation phenotype; all study groups should receive comparable skilled lactation support; milk output should be measured with a validated protocol; and infant outcomes should include feeding effectiveness, supplementation, weight trajectory, and adverse events. Mechanistic substudies may examine prolactin, metabolomic or phytochemical markers, and transfer of selected constituents into human milk, but mechanistic endpoints should complement rather than replace clinically meaningful outcomes (Kelleher *et al.*, 2024).

The evidence should move from "species efficacy" toward "preparation-specific benefit-risk." For Moringa, this means distinguishing capsules from food-level leaf powder and matching the claimed indication to the population studied. For katuk, safety conclusions must remain sensitive to processing and dose. For torbangun, ethnopharmacological knowledge should be preserved while traditional preparations are linked to voucher specimens, chemical characterization, and contemporary mother-infant outcomes. This approach allows traditional Indonesian practice to be investigated without either dismissing it or overstating what current evidence proves.

Neutral results should also remain visible. The absence of a statistically significant day-3 difference in the Moringa capsule trial is scientifically informative because it helps define the preparation, dose, and postpartum window in which a measurable effect was not demonstrated (Fungtammasan & Phupong, 2022). A credible evidence base grows from transparent methods, reproducible products, appropriate comparators, and outcomes that matter to both mother and infant.

CONCLUSION

Selected herbal galactagogues used in Indonesian postpartum care sit at the intersection of natural-product science and maternal-infant medicine. *Moringa oleifera*, *Phyllanthus androgynus*, and *Coleus amboinicus* each have

traditional or clinical evidence that justifies continued investigation, but no plant name alone supports a universal efficacy or safety claim. The clinically relevant unit is a defined preparation used in a defined maternal context with measurable infant outcomes. A rigorous pathway therefore begins with diagnosis of the lactation problem, correction of modifiable maternal and infant factors, and optimization of milk removal. When an herbal adjunct is considered, botanical authentication and standardization, maternal clinical stability, and infant monitoring should be integrated. This preparation-specific mother-infant framework provides a reproducible basis for future interdisciplinary galactagogue research and for cautious translation of traditional postpartum practices.

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