การศึกษาเชิงคุณภาพเปรียบเทียบตำรับยาสมุนไพรสำหรับหญิงให้นมบุตร จากการสัมภาษณ์ผู้เชี่ยวชาญและคัมภีร์ประถมจินดา

A Qualitative Comparative Study of Herbal Formulations for Lactating Women Using Expert Interviews and the *Prathom-Jinda* Scripture

นิพนธ์ต้นฉบับ **Original Article**

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บทคัดย่อ

วัตถุประสงค์: เพื่อค้นหาปัจจัย อาการ และแนวทางการวินิจฉัยภาวะน้ำนมไม่เพียงพอและชนิดสมุนไพรที่เป็นส่วนประกอบของสูตรยาสมุนไพรไทย **วิธีการศึกษา:** งานวิจัยเชิงคุณภาพโดยการ 1) สัมภาษณ์แบบกึ่งโครงสร้างในผู้เชี่ยวชาญ 11 คนเกี่ยวกับลักษณะหญิงให้นมบุตรที่น้ำนมไม่เพียงพอ ปัจจัยที่ทำให้น้ำนมไม่เพียงพอ และประสบการณ์การใช้ยาตำรับสมุนไพรในหญิงให้นมบุตร 2) ศึกษาข้อมูลจากคัมภีร์ประถมจินดาเกี่ยวกับตำรับยาที่ใช้เพิ่มปริมาณและคุณภาพน้ำนม เปรียบเทียบสมุนไพรและข้อบ่งใช้ ของตำรับยาสมุนไพรจาก 2 แหล่ง วิเคราะห์โดยใช้สถิติเชิงพรรณนา และค่าสัมประสิทธิ์ความคล้ายคลึงและการวิเคราะห์เครือข่ายเพื่อแสดงความสัมพันธ์ระหว่างสมุนไพร แหล่งที่มา และสรรพคุณ **ผลการศึกษา:** ผู้เชี่ยวชาญให้ข้อมูลว่าปัจจัยของน้ำนมไม่เพียงพอคืออาหารที่รับประทานขณะตั้งครรภ์และหลังคลอด (ร้อยละ 63.6) อาการที่พบบ่อยคือปริมาณน้ำนมไม่พอ (ร้อยละ 27.3) วินิจฉัยจากพฤติกรรมการให้นมและลักษณะน้ำนม ใช้ยาสมุนไพร 6 ตำรับ ส่วนในคัมภีร์พบ 16 ตำรับซึ่งร้อยละ 43.8 เป็นตำรับที่ทำน้ำนมให้บริสุทธิ์ ตำรับยาเพิ่มน้ำนมที่ผู้เชี่ยวชาญใช้จริงมี 4 ตำรับ ส่วนในคัมภีร์มี 2 ตำรับ ใช้สมุนไพรเหมือนกัน 7 ชนิดโดยใช้ขิงมากที่สุด ร้อยละ 36.7 ในผู้เชี่ยวชาญ และ 43.8 ในคัมภีร์ สมุนไพรที่ใช้ปรับสมดุลร่างกายจากสองแหล่ง พบว่ามี 4 ชนิด ได้แก่ พริกไทย ไทรย้อยใบแหลม มะตูม และยังพบว่ามีสมุนไพรจำนวน 14 ชนิดที่ใช้เฉพาะในผู้เชี่ยวชาญ การใช้สมุนไพรของผู้เชี่ยวชาญและในคัมภีร์คล้ายคลึงน้อย (ค่าสัมประสิทธิ์ความคล้ายคลึง 0.139) การวิเคราะห์เครือข่ายชี้แนะว่าสมุนไพรบางชนิดเป็นแกนกลางของเครือข่ายการรักษา ทั้งการเพิ่มน้ำนม การปรับสมดุลร่างกาย และการบำรุงคุณภาพน้ำนม **สรุป:** ผู้เชี่ยวชาญใช้พฤติกรรมการกินและลักษณะน้ำนมวินิจฉัยภาวะน้ำนมไม่เพียงพอ ใช้หลายตำรับยาสมุนไพรเพื่อเพิ่มและบำรุงน้ำนม การใช้การวิเคราะห์เชิงเครือข่ายช่วยให้เห็นโครงสร้างและเหตุผลเชิงการรักษาของตำรับยาชัดเจนยิ่งขึ้น มีสมุนไพรบางชนิดที่มีการใช้จริงต่างจากที่พบในคัมภีร์ประถมจินดา

คำสำคัญ: การแพทย์แผนไทย; หญิงให้นมบุตร; คัมภีร์ประถมจินดา; การเพิ่มน้ำนม; น้ำนมไม่เพียงพอ

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Abstract

Objective: To explore factors, symptoms, and diagnostic approaches associated with insufficient lactation of Thai Traditional medicine experts. **Methods:** This qualitative study used 1) semi-structured interviews with eleven experts about tative data, and to compare the herbal formulations used in current practice with those documented in the *Prathom-Jinda* scripture. **Methods:** This qualitative study involved semi-structured interviews with eleven experts to examine the characteristics of lactating women with insufficient milk supply, contributing factors, and experiences in prescribing herbal formulations. Information on relevant herbal formulas was also extracted from the *Prathom-Jinda* scripture. Herbs and their indications from both sources were compared, and the data were analyzed using descriptive statistics, similarity indices (Jaccard similarity coefficient), and network analysis to illustrate the relationships among herbs, data sources, and their therapeutic functions. **Results:** Interviews with experts showed that the most frequently reported contributing factor to insufficient lactation was dietary habits during pregnancy and the postpartum period (63.6%). The most common symptom was inadequate milk volume for breastfeeding or storage (27.3%). Diagnostic approaches were primarily based on breastfeeding behaviors and observable characteristics of breast milk. Six herbal formulations were used by experts for lactating women, whereas the *Prathom-Jinda* scripture documented sixteen formulas for this purpose, of which 43.8% were intended for purifying breast milk. Four formulas were reported by experts as being used to increase milk supply, while the scripture contained two such formulas. Seven herbs were found to overlap between the two sources in formulas for increasing milk production, with ginger being the most frequently used herb—36.7% among experts and 43.8% in scripture-based formulas. For herbs used to balance body elements, four were shared between experts and scripture formulations (*Piper nigrum* L., *Ficus benjamina*, *Aegle marmelos* (L.) Corrêa ex Roxb., and *Glycyrrhiza glabra* L.). Additionally, fourteen herbs were used exclusively in expert practice. Analysis using the Jaccard similarity coefficient indicated a low degree of overlap between expert-used and scripture-based herbs (0.136). However, network analysis revealed that specific herbs occupied central positions within the therapeutic network, supporting milk production, body element regulation, and breast milk quality improvement. **Conclusion:** Thai Traditional Medicine experts emphasize dietary behavior and breast milk characteristics in evaluating insufficient lactation and employ diverse herbal formulations for lactation enhancement. Network analysis clarified the therapeutic structure of these formulations, revealing both shared and practice-specific herbs when compared with the *Prathom-Jinda* scripture. Further clinical research is needed to inform evidence-based breastfeeding care guidelines.

Keywords: Thai traditional medicine; lactating women; *Prathom-Jinda* scripture; galactagogue; insufficient milk supply

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Introduction

The lactation period is important for maternal and newborn health, as breast milk provides essential nutrients and immune protection to infants. It reduces rates of infectious morbidity and mortality, lowers the risk of dental malocclusions, and enhances cognitive development. A previous study indicates that extended breastfeeding is associated with higher intelligence and greater health benefits in comparison to shorter breastfeeding durations or formula feeding.[1, 2]

Breastfeeding provides several benefits for mothers, including a reduced risk of breast cancer, improved birth spacing, and a potential decrease in the risk of diabetes and ovarian cancer.[3] The World Health Organization (WHO) recommends that all infants should be breastfed within one hour of birth and exclusively breastfed for a minimum duration of six months. WHO also recommends continued breastfeeding for up to 24 months. The highest global prevalence of breastfeeding at 12 months occurs in sub-Saharan Africa, South Asia, and certain regions of Latin America. The United Nations Children's Fund (UNICEF) indicated that 29% of women in Thailand practiced exclusive breastfeeding for their infants during the initial six months. The breastfeeding rate increased from 14% in 2019.[4] The initiation of breastfeeding declined from 49.6% in 2006 to 34% in 2019.[5]

Galactagogues—defined as drugs, foods, and herbal substances that promote the initiation, maintenance, or augmentation of breast milk production—play an increasingly important role in global lactation support.[6] Historically, numerous botanical galactagogues have been used across traditional medical systems to enhance milk supply, while modern pharmacological agents act through prolactin- and oxytocin-mediated pathways to achieve similar effects.[7] Despite the widespread need, scientific evidence supporting the safety and efficacy of many pharmaceutical and herbal galactagogues remains limited, and clinical guidelines are often unclear. As a result, women who experience persistent insufficient milk production, along with adoptive mothers seeking to induce lactation, are turning to galactagogues with increasing frequency worldwide,[7, 8] reflecting a growing demand for accessible and culturally acceptable lactation-enhancing options.

Insufficient milk production is consistently identified as one of the most common problems among lactating women.[2, 4] Many women use herbal medicines and supplements through self-medication based on advice from friends and family.[9] However, concerns about the potential harm of medical treatments to infants. This leads many lactating women to seek alternative solutions, including traditional medicine and herbal remedies under the guidance of healthcare professionals. In Thailand, the use of herbal medicine to enhance both the quantity and quality of breast milk is widely practiced across various cultures and local regions.[5]

In Thai Traditional Medicine, postpartum care is a major area of emphasis, particularly in addressing common conditions such as insufficient breast milk production. The Khamphi *Prathom-Jinda*, an ancient medical scripture, serves as a foundational reference in the curricula of both Thai Traditional Medicine and Applied Thai Traditional Medicine programs. This scripture covers a wide range of topics, including the origin of human beings, pregnancy, maternal care practices, and related cultural beliefs. It offers detailed recommendations for postpartum self-care, classifies various types of breast milk, and presents numerous herbal formulations designed to increase milk volume and improve milk quality.[10] According to Thai Traditional Medicine, breast milk is formed from blood before childbirth. The infant's suckling stimulates the wind element, which drives milk flow. After delivery, if the fire element becomes imbalanced—due to factors like consuming cooling foods or lack of rest—it can disrupt the circulation of wind and blood. This leads to reduced energy for milk expulsion or insufficient stimulation of milk production, resulting in low milk supply. In *Prathom-Jinda*, herbal remedies used to enhance or purify breast milk are commonly referred to in Thai as *Prasa-Nam-Nom*, where Prasa denotes enhancement or purification and *Nam-Nom* means breast milk.[10] However, although many formulations share the name *Prasa-Nam-Nom*, their compositions may vary depending on the intended purpose, specific condition, and presenting symptoms.

In clinical practice, practitioners typically prescribe individualized herbal decoctions, often in combination with breast massage, and occasionally as standalone treatments. Some practitioners also draw on classical formulations found in ancient texts, such as the *Prathom-Jinda* scripture.[10] The literature has found that a variety of herbal formulas are currently used by lactating women in Thailand.[10, 11] However, the specific ingredients included in these formulas often vary based on regional herb availability, local traditions, or the personal experiences of individual practitioners. This variation reflects the diversity of traditional practices and the influence of local knowledge and practitioner experience in Thai Traditional Medicine. The core principle underlying the use of these herbal formulations is that the selected herbs can stimulate lactation and improve the quantity and quality of breast milk. Some formulations are also intended to help rebalance the body's elements following childbirth.

Despite the widespread use of herbal therapies, Thai Traditional Medicine currently lacks a standardized list of essential herbal medicines specifically for lactating women. Therefore, this study aims to explore, through interviews with Thai Traditional Medicine experts, the characteristics, diagnostic criteria, and contributing factors of mothers with insufficient lactation, as well as to compare the herbal formulations currently used in clinical practice with those documented in the *Prathom-Jinda* Scripture. By analyzing and comparing these sources, the study seeks to enhance the understanding of Thai Traditional Medicine's role in postpartum care and highlight its potential contributions to clinical practice and evidence-based medicine.

Methods

This research was a qualitative study that employed interviews to explore the factors, symptoms, and diagnostic approaches associated with insufficient lactation from the perspective of Thai Traditional Medicine experts, used interview-based qualitative data, and compared the herbal formulations used in current practice with those documented in the *Prathom-Jinda* scripture.

The study was approved by the Research Ethics Committee, Faculty of Medicine, Siriraj Hospital, Mahidol University, Thailand (Approval No. Si 161/2020).

1. Study population

A total of eleven key informants were included in this qualitative study. Key informants were selected using purposive sampling to ensure that participants possessed the expertise relevant to the study objective. Key informants were selected based on the following qualification requirements: (1) possession of a valid professional license in Applied Thai Traditional Medicine, Traditional Thai Medicine, or Thai Herbal Pharmacy; (2) a minimum of 15 years of clinical experience in treating postpartum women or prescribing herbal formulations; and (3) current employment at the Center of Applied Thai Traditional Medicine, Siriraj Hospital, Mahidol University. These criteria ensured that all key informants had substantial expertise and practical experience relevant to the study objectives. Exclusion criteria encompassed individuals who were unable to disclose the herbal formulas they routinely used for lactating women, those who maintained proprietary or confidential formulations, and those unwilling to participate in the study.

2. Materials

2.1 Audio recorder (MP3 recorder)

2.2 Field notes

2.3 Interview questionnaire: The interview guide was developed through a systematic multi-step process to ensure clarity, relevance, and qualitative rigor. The objectives of the interviews were first defined, and an initial set of open-ended questions was drafted and pilot-tested with a small group of informants. Feedback from the pilot phase was used to refine the wording and flow of the questions. Content validity was strengthened through expert review by specialists in Thai Traditional Medicine and qualitative research, who assessed the relevance and appropriateness of each item. Peer debriefing within the research team was conducted to minimize bias and ensure consistency. Credibility was further supported through member checking, in which selected participants confirmed the accuracy of the summarized interview content. First, the objectives of the qualitative interview were clearly defined, focusing on the use of herbal decoctions to increase milk supply in postpartum women according to Thai Traditional Medicine. An initial pool of interview questions was drafted and pilot-tested with a small group of informants to assess clarity, relevance, and comprehensibility. Feedback from the pilot interviews was summarized and used to revise and refine the question set. The questionnaire consisted of open-ended questions divided into three sections. Section 1 focused on the experts' characteristics and backgrounds. Section 2 explored their experiences using herbal medicine for lactating women, including causes, symptoms, and diagnoses. Section 3 investigated the herbal medicine formulas they have been using, covering aspects of names, properties, indications, and detailed herbal lists, including the taste of herbs, parts used, and amounts used in each recipe.

2.4 *Prathom-Jinda* scripture in Tamra Kanphaet Thaidoem (Phaetthayasat Songkhro Chabap Anurak) vol. 1,2.

3. Data collection from an interview

Participants were provided with detailed information about the study and invited to participate after reviewing the

information sheet and survey questions. They were required to sign a consent form before completing the questionnaire and before the interview was voice-recorded for the study. The interviews were conducted face-to-face by a researcher with a background in Applied Thai Traditional Medicine. Each interview lasted approximately two hours. To minimize participant fatigue, appropriate breaks were incorporated during or between interview sessions. During the interviews, the researcher took notes and recorded the participants' voices. Key content from the recordings was selectively transcribed and summarized for interpretation and analysis. Bias was reduced through the use of a semi-structured interview guide, ensuring consistency across all interviews. During the interviews, the researcher maintained a neutral stance and avoided leading questions. Manual coding was conducted independently by two researchers. Any discrepancies were resolved through consensus discussions, which helped refine the emerging themes and enhance the credibility and confirmability of the findings.

4. Data Collection from Prathom-Jinda scripture

The data from the *Prathom-Jinda* scripture were analyzed to collect herbal formulas by researchers. Four licensed Applied Thai Traditional Medicine practitioners, including the primary researcher, independently extracted the herbal formulas from the Prathom-Jinda scripture and collaboratively analyzed the data. Each researcher had more than ten years of professional experience. Independent review, cross-validation, and consensus discussions were used to enhance the accuracy and credibility of the analysis.

Herbal formulas were extracted from the *Prathom-Jinda* scripture with a focus on those indicated for lactation enhancement, including both milk production and quality improvement. Each recipe was documented, noting the specific herbs used, their quantities, and their properties. The collected formulas were grouped according to their indications (e.g., increasing milk supply, fortifying milk quality). Herbs were further categorized by their tastes, as per Thai traditional medicinal principles. The herbal formulas documented from the *Prathom-Jinda* scripture were compared to the data from the interview part. Comparisons were made based on the types of herbs used, their indicated uses, preparation methods, and other relevant properties.

5. Data analysis

The qualitative analysis was conducted by a researcher with professional training in Applied Thai Traditional Medicine and more than 10 years of experience in clinical practice and research. The interview data were transcribed and analyzed using thematic analysis. Key content from the audio recordings was selectively transcribed, coded, and grouped into categories and emerging themes. To ensure rigor in qualitative inquiry, all interviews were audio-recorded and supplemented with field notes to capture contextual details. Data collection continued until no new information emerged, indicating data saturation. The accuracy of transcripts was verified against the original audio files. Preliminary interpretations were returned to selected participants for validation through member checking. Triangulation was performed by comparing the interview data with the herbal formulas extracted from the *Prathom-Jinda* scripture. Manual coding was conducted independently by two researchers, followed by consensus discussions to refine emerging themes and enhance the credibility and confirmability of the findings. Herbal formulas extracted from the *Prathom-Jinda* scripture were compared with expert-reported formulas based on herb composition, indications, and preparation methods.

6. Trustworthiness of the data

Trustworthiness was ensured through member checking, triangulation between interview data and scripture-based formulas, reflexivity of the interviewer, transcript verification, and independent coding followed by consensus discussions to enhance credibility and dependability.

7. Statistical analysis

Descriptive statistics were used to summarize and quantify the findings. Frequencies, percentages, maximum values, and minimum values were calculated for relevant variables, such as the number of herbs used, the frequency of specific herbal ingredients, and the overlap between expert and scripture-based formulations. The degree of overlap between expert-reported and scripture-based herbs can be evaluated using similarity coefficients. The Jaccard index, calculated as the number of shared herbs divided by the total number of unique herbs across both sources, offers an objective measure of herbal composition similarity.

8. Network analysis

A network analysis was performed to explore relationships among herbs, their therapeutic functions, and their knowledge origins (scripture vs. expert). Herbs were categorized by function (galactagogue, purifier/nourishment, balancer), and citation frequencies were extracted from both the *Prathom-Jinda* scripture and interviews with applied Thai traditional medicine practitioners. A tripartite network was constructed comprising herb nodes, function nodes, and background nodes. Edges represented (1) herb–function assignments (weighted by total citation frequency) and (2) herb–source connections (weighted by frequency from scripture or experts). The network visualization was generated using Python (NetworkX and Matplotlib libraries) with the assistance of an AI model (ChatGPT, OpenAI) to automate code generation and figure rendering.

Results

The characteristics of the 11 interviewed experts are shown in Table 1. The majority of the experts were aged between 40-60 years (54.5%). Most of the experts had 15-20 years of work experience (45.5%). Additionally, a significant proportion of the experts specialized in the field of applied Thai traditional medicine license (90.9%).

Table 1 Characteristics of experts (n=11).

Characteristics	n (%)
Gender	
Male	3 (27.3)
Female	8 (72.7)
Age (mean±SD)	48.2±11.6
<40 years	4 (36.4)
40-60 years	6 (54.5)
>60 years	1 (9.1)
Work experience (mean±SD)	25.2±9.5
15-20 years	5 (45.5)
20-30 years	3 (27.3)
>30 years	3 (27.3)
Expertise field	
Applied Thai Traditional Medicine	10 (90.9)
Thai Traditional Pharmacy	1 (9.1)

Table 2 shows the experts' experiences with lactating women. The most common cause of lactation problems was eating behaviors during pregnancy and after childbirth (63.6%). For example, consuming large amounts of hot or spicy foods can lead to body element imbalances. Additionally, some mothers do not consume a balanced diet or the five essential food groups. Other causes of lactation problems identified by the experts included body element imbalances, mental stress or anxiety, hereditary lactation issues, sleep deprivation, and physical changes during pregnancy or the postpartum period. Specific physical issues mentioned were a thin body shape, short nipples, blood loss after delivery, and inadequate lochia flow. Furthermore, it was noted that mothers with differences in lactation characteristics according to Thai traditional medicine or those who had cesarean deliveries often produced less milk compared to those who had normal deliveries.

The study investigated common symptoms among lactating women as reported by experts. All experts reported that inadequate milk volume for breastfeeding or storage was a common symptom (100%). This can be evaluated by observing insufficient milk volume for the baby's needs, no milk production after 2 days post-delivery, and mothers wanting to build a milk stock for when they return to work, but only producing enough for daily consumption. Other symptoms associated with lactation problems included nipple wounds, mastitis, and breast pain. Additionally, some patients expressed concerns about the quality of their breast milk, noting that it appeared light in concentration (Table 2).

The study examined the diagnostic criteria for lactating women as reported by experts. All experts (100%) primarily relied on the history of breastfeeding behavior and characteristics to assess lactation issues. This included evaluating milk volume and breastfeeding methods. Some experts also incorporated physical examinations to identify abnormalities related to breastfeeding, such as the mother's body shape, wrist pulse, breast type, nipple type, and abdominal pulse. Additionally, one expert employed a calculation of milk volume in relation to the baby’s weight as part of the assessment (Table 2).

Table 2 Experts' experiences with common breast milk problems: causes, symptoms, and diagnosis criteria in lactating women (n=11).

Experts' Experiences	n (%)
Causes	
Eating behaviors during pregnancy and after childbirth	7 (63.6)
Body element imbalance	5 (45.5)
Mental stress or anxiety	4 (36.4)
Hereditary lactation problems	4 (36.4)
Physical change during pregnancy or postpartum period	3 (27.3)
Sleep deprivation	3 (27.3)
Lactation characteristics in Thai traditional medicine	1 (9.1)
Cesarean or normal delivery methods	1 (9.1)
Symptoms	
Inadequate milk volume for breastfeeding or storage	11 (100.0)
Lactation problems (sore nipples, mastitis, pain, etc.)	3 (27.3)

Breast milk concentration	1 (9.1)
Diagnosis criteria	
History of breastfeeding behavior and characteristics	11 (100.0)
Physical examination revealing abnormalities and issues	2 (18.2)
Milk volume in relation to baby weight	1 (9.1)

The data from expert interviews identified six herbal formulas employed to promote lactation (Figure 1). Among these, two were hereditary formulations transmitted through generations, preserving traditional practices. One recipe was a standardized formulation derived from Ayurved school teachings, ensuring compliance with classical principles. Another recipe was sourced from *Khamphi Maha-Chota-Rat*, an ancient text that highlights the historical foundations of traditional medicine. Furthermore, two formulas were customized by senior experts, reflecting their extensive experience and innovative approaches to meeting specific patient requirements. The recipe *Tamrab Ya Phoem Nam #1* was used by 8 experts (72.7%) to increase milk volume. The other formulas were used by 1-2 experts to enhance milk quality, volume, and nourish breast milk. Most of the formulas were prepared as decoctions.

The comparison between the herbal formulations reported by experts and those documented in the *Prathom-Jinda* Scripture is presented in Table 3. The six expert-reported formulas comprised a total of twenty-five herbs, whereas sixty-seven herbs were identified from sixteen scripture-based formulas. The number of herbal ingredients per formula ranged from three to eleven in the expert group and from three to seventeen in the scripture group. Eleven herbs were shared by both sources, indicating partial overlap in herbal composition. Fourteen herbs were used exclusively by experts, while fifty-six herbs were found only in the *Prathom-Jinda* Scripture. Based on these data, the Jaccard similarity index was calculated to be 0.136, reflecting a low degree of similarity between expert-used and scripture-based herbal compositions. Most formulas in both groups were prepared as decoctions, and the hot taste was the most common characteristic, followed by a gentle taste.

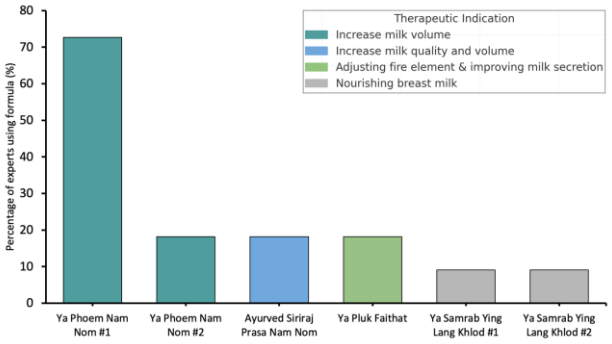

Figure 1 Herbal formulas to increase milk volume from expert interviews (n=11)

The study analyzed and compared the herbal formulas obtained from expert interviews with those documented in the *Prathom-Jinda* Scripture for lactating women (Figure 2). Among the scripture-based formulas, seven (43.8%) were indicated for purifying breast milk. Two formulas from the scripture and four formulas reported by experts were specifically indicated as galactagogues for increasing breast milk volume. Additionally, six formulas in the scripture and two formulas reported by experts were intended for nourishing breast milk. One formula for deodorizing breast milk was found only in the *Prathom-Jinda* Scripture and was not reported by any expert.

Table 3 Comparison of the of herbal formulations in the Prathom-Jinda Scripture and formulas reported by experts.

Herbal medicine used	**Formulas from experts**	**Formulas in *Prathom-Jinda* scripture**
Number of formulas	6	16
Number of herbs in formulas	25	67
Herbs shared by both sources (overlap)	11	11
Herbs unique to each source	14	56
Number of herb ingredient per formula		
Max.	11	17
Min.	3	3
Drug preparation		
Decoction	6 (100%)	13 (81%)
Power	0	3 (19%)
Taste of formula (Ya Rot Prathan)		
Hot taste	4 (66.7%)	13 (81%)
Gentle taste	2 (33.3%)	3 (19%)

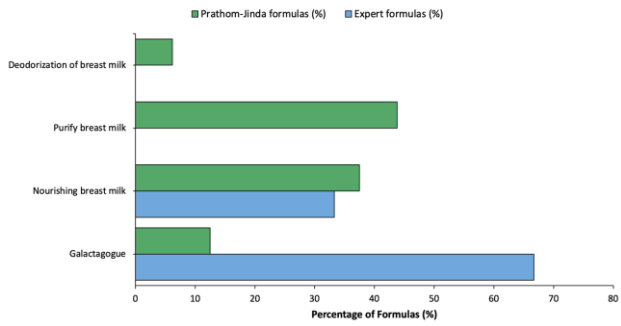

Figure 2 Comparison of the therapeutic indication of herbal formulations in the *Prathom-Jinda* Scripture and formulas reported by experts.

Table 4 presents the overlapping herbs reported by experts and documented in the *Prathom-Jinda* scripture for milk enhancement and body element balancing. There were seven herbs used for nourishing or increasing breast milk volume. *Zingiber officinale* Roscoe (Khing) was the most frequently used by both experts (36.7%) and recorded in the scripture (43.8%). However, two herbs, *Iresine herbstii* Hook. f. and *Ardisia elliptica* Thunb. were used by experts but not mentioned in the scripture for breast milk nourishment. For herbs used to balance body elements, four herbs— *Piper nigrum* L., *Ficus benjamina* L., *Glycyrrhiza glabra* L., and *Aegle marmelos* (L.) Corrêa ex Roxb.—were common to both expert formulas and scripture. Twelve herbs were used by experts but not found in the scripture for balancing body elements.

The network contained 86 nodes and demonstrated three major functional clusters (Figure 3). Balancer herbs formed the largest and most scripture-connected group. Galactagogue herbs showed the strongest overlap between scripture and expert sources, forming high-centrality hubs. Purifier/nourishment herbs were more commonly linked to expert practitioners, forming a distinct modern-practice subnetwork.

Discussions and Conclusion

Various herbs are used in Thai Traditional Medicine to promote breast milk production, many of which have been historically documented in classical texts such as the *Prathom-Jinda* scripture, a key reference still consulted by practitioners today. The findings of this study underscore the importance of integrating traditional knowledge with contemporary clinical practices.

Table 4 Overlapping herbs reported by experts and documented in the *Prathom-Jinda* scripture for milk enhancement and body element balancing.

Herbs	Thai local name	Parts used	Frequency (%) reporting use of this herb by experts (n=11 experts)	Frequency (%) of recording formulas in the scripture (n=16 formulas)
Benefits of herbs for nourishing or increasing breast milk volume				
Acorus calamus L.	Wan Nam	rhizome	2 (18.2)	1 (6.3)
Cyperus rotundus L.	Haeomu	corm	3 (27.3)	5 (31.3)
Euphorbia hirta L.	Nam nom ratchasi	whole plant	3 (27.3)	2 (12.5)
Piper retrofractum Vahl.	Dipli	fruit	3 (27.3)	2 (12.5)
Piper sarmentosum Roxb.	Cha Phlu	root	2 (18.2)	1 (6.3)
Piper interruptum Opiz.	Sa Khan	vine	2 (18.2)	1 (6.3)
Zingiber officinale Roscoe.	Khing / Khing haeng	rhizome	4 (36.7)	7 (43.8)
Benefits of herbs for balancing body elements				
Aegle marmelos (L.) Corrêa ex Roxb.	Matum	fruit	1 (9.1)	2 (12.5)
Ficus benjamina L.	Sai Yoi Bai Laem	air root	1 (9.1)	1 (6.3)
Glycyrrhiza glabra L.	Cha-em Thet	root	1 (9.1)	1 (6.3)
Piper nigrum L.	Phrikthai	fruit	2 (18.2)	1 (6.3)

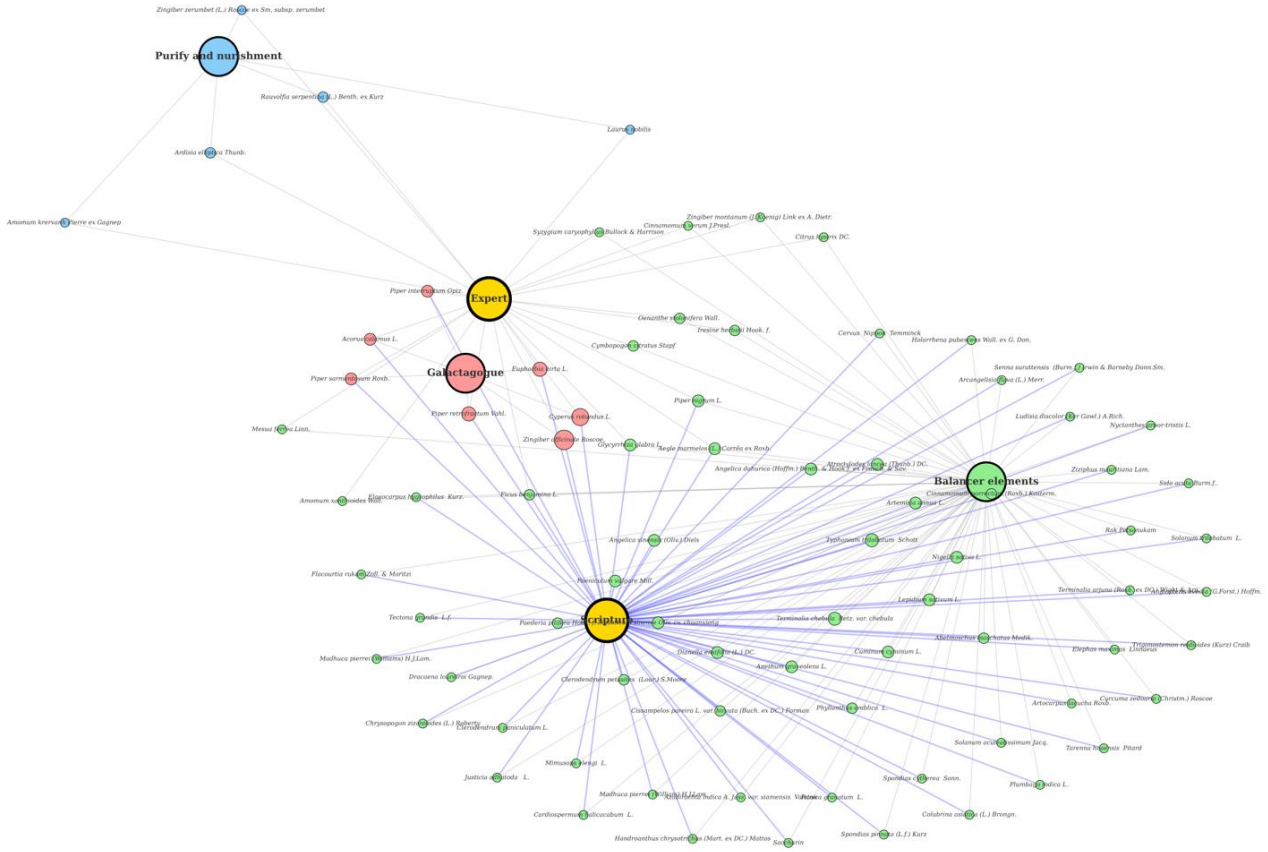

Figure 3 Network illustrating the relationships among herbs, their therapeutic functions, and knowledge sources. Node colors: red = galactagogue; blue = purify and nourishment; green = balancer elements; yellow = knowledge sources (Scripture, Expert). Node size reflects total citation frequency. Blue edges represent scripture–herb connections.

The diagnostic criteria employed by experts primarily focus on the mother's breastfeeding history and observable characteristics of breast milk. Practitioners assess factors such as the milk's color, taste (e.g., sourness), and the presence of bubbles or air—indicators that may reflect poor milk quality and justify the use of herbal remedies to purify and nourish breast milk. This approach aligns with diagnostic methods described in the *Prathom-Jinda* Scripture, which outlines a traditional "milk test." In this test, a drop of breast milk is placed in a bowl of water and observed. The milk is classified into two types: *Nam-Nom-Ek*, which has a white color similar to a conch shell, sinks directly without splashing, and forms a circular shape—considered the highest quality; and *Nam-Nom-Tho*, which is also white but splashes and sinks irregularly, indicating good, though slightly inferior, quality.[10] While this diagnostic method is occasionally used in modern practice, most practitioners now rely on visual inspection of the milk's color and concentration, supported by clinical experience.

In cases where good-quality milk—such as *Nam-Nom-Ek* or *Nam-Nom-Tho*—is present but produced in insufficient quantity, practitioners may prescribe galactagogue formulations to enhance milk volume.[12] These formulas are commonly referred to as *Prasa-Nam-Nom*, with *Prasa* referring to purification, fortification, or stimulation of milk production. This study identified a key distinction: while expert formulas predominantly aim to increase breast milk volume, the *Prathom-Jinda* Scripture places greater emphasis on the purification and nourishment of breast milk. Practitioners do not prescribe medicines strictly according to the *Prathom-Jinda* Scripture. However, the medicinal ingredients and underlying principles have been adapted and applied in their formulas. Importantly, *Prasa-Nam-Nom* formulations may vary in composition depending on the intended therapeutic purpose, specific condition, and presenting symptoms. Therefore, Thai

Traditional Medicine practitioners must conduct individualized assessments and select herbal formulas based on the unique symptoms and clinical needs of each patient.

The herbal formulas identified in this study are consistent with findings from previous research, particularly regarding the galactagogue properties of *Prasa-Nam-Nom* formulations. Supporting this evidence, a study conducted at Phromphiram Hospital investigated the use of a *Prasa-Nam-Nom* decoction derived from the *Prathom-Jinda* Scripture in postpartum mothers.[13] The results indicated that the group receiving the *Prasa-Nam-Nom* decoction showed a significantly greater increase in milk volume beginning on the third postpartum day, and a higher overall milk volume compared to the standard treatment group after two weeks of administration. These findings further support the efficacy of *Prasa-Nam-Nom* formulations in enhancing lactation and align with the patterns observed in the present study.

Further evidence is provided by earlier research on the *Ayurved Siriraj Prasa-Nam-Nom* formula (PNF), which contains four herbal ingredients: *Euphorbia hirta* L., *Rauvolfia serpentina* (L.) Benth. ex Kurz, *Ficus benjamina* L., and *Zingiber zerumbet* (L.) Roscoe ex Sm. subsp. zerumbet. Among these, *Euphorbia hirta* L. has demonstrated *in vivo* galactagogue activity by enhancing milk production, stimulating prolactin secretion, and promoting the development of the lobuloalveolar system in mammary glands.[11] In a previous study, the PNF traditional decoction preparation demonstrated comparable effectiveness to domperidone in enhancing both milk production and prolactin levels in lactating rats. The PNF powder had no such effects.[14] This result aligned with a clinical study, three-day administration of the formulation in capsule form (powder of PNF) did not significantly affect breast milk volume, creamatocrit, or serum prolactin levels.[15] Consequently, the treatment, when administered as a decoction dosage form, was considered safe and potentially beneficial in maintaining prolactin concentrations. When comparing the herbs used in the previous study with those identified in the present study, *Euphorbia hirta* L. and *Ficus benjamina* L. are also found in the *Prathom-Jinda* Scripture, while *Rauvolfia serpentina* (L.) Benth. ex Kurz. and *Zingiber zerumbet* (L.) Roscoe ex Sm. subsp. zerumbet are frequently used by contemporary practitioners. This overlap between classical and expert-applied herbs reinforces the continuity between traditional sources and current clinical practice. These findings demonstrate how Thai Traditional Medicine effectively integrates historical knowledge and practitioner experience in the formulation of herbal treatments for lactating women.

This study also revealed that experts frequently used herbal formulations in another Scripture. One notable example is the use of a recipe from the *Khamphi Maha-Chota-Rat*, a classical Thai text that focuses on women's health and postpartum conditions.[16] The formulation known as *Tamrab Ya Pluk Faithat* from this scripture includes 11 herbal ingredients. Of these, eight herbs—*Zingiber officinale* Roscoe, *Piper retrofractum* Vahl., *Piper sarmentosum* Roxb., *Piper interruptum* Opiz., *Iresine herbstii* Hook. f., *Ardisia elliptica* Thunb., *Cyperus rotundus* L., and *Acorus calamus* L.—have documented benefits for nourishing or increasing breast milk volume. The remaining three herbs are used primarily for balancing the body's elements. This highlights the integration of multiple classical sources in current practice and the importance of individualized treatment approaches in Thai Traditional Medicine.

The most commonly used herb across both sources—the expert interviews and the *Prathom-Jinda* scripture—was *Zingiber officinale* Roscoe. Ginger may enhance lactation through multiple mechanisms, primarily via its bioactive compounds such as gingerols and shogaols, which promote vasodilation by stimulating muscarinic receptors and inhibiting calcium channels.[16] This vasodilatory effect increases blood flow to the mammary glands, potentially supporting milk production, while its thermogenic properties may further improve peripheral circulation.[16] A randomized controlled trial reported that *Zingiber officinale* Roscoe. can enhance milk flow by promoting vasodilation and modulating hormonal pathways, and also noted its estrogen-like activity, which may support mammary function and increase the rate of milk secretion.[17] In addition to the prominence of *Zingiber officinale* Roscoe. in both expert practice and the *Prathom-Jinda* scripture, several other herbs recurrently appearing in the formulations exhibit pharmacological activities consistent with their traditional roles in supporting lactation.[10] *Cyperus rotundus* L.[18] and *Euphorbia hirta* L.[19] provide the strongest experimental evidence, demonstrating increased milk production, prolactin stimulation, and mammary lobuloalveolar development, corresponding with expert reports describing their use in increasing milk volume. Other herbs may influence

lactation through indirect yet physiologically relevant mechanisms. The traditional uses of *Piper sarmentosum* Roxb. encompass a broad spectrum of biological activities, including anticancer, antibacterial, antioxidant, anti-hypertensive, anti-inflammatory, and antidiabetic effects, reflecting its role as a multipurpose herb that supports general health and physiological balance.[20] *Glycyrrhiza glabra* L. may further promote ductal development through estrogen-like activity.[20] Herbs such as *Piper retrofractum* Vahl. lack direct lactation-specific evidence but may contribute supportive antimicrobial, warming, or synergistic effects within multi-herb formulations.[21]

Together, these pharmacological insights illustrate how individual herbs within postpartum formulations contribute complementary actions—ranging from prolactin stimulation and mammary tissue development to circulatory enhancement and systemic recovery—supporting the concept that Thai traditional recipes operate as multi-target therapeutic systems. This systems-based pattern aligns with the results of the network analysis, which demonstrated that remedies for balancing body elements and those for improving lactation shared several key herbal ingredients despite the overall low overlap reflected by the Jaccard index. The convergence of shared herbs across functional categories suggests that practitioners select ingredients not only for direct galactagogue effects but also for their broader roles in restoring postpartum physiological balance. This tendency highlights how traditional medicine adapts formulations based on local practices, environmental contexts, and the cumulative clinical experience of practitioners, reinforcing the synergistic logic underlying the herbal combinations used in both expert practice and scripture-based formulations.

These differences may also highlight the personalized approach adopted by Thai Traditional Medicine practitioners, who tailor treatments to suit the patient's constitution, postpartum condition, and health history. For instance, *Piper nigrum* L. and *Ficus benjamina* L., which appeared in both sources, are widely recognized for their broader therapeutic effects, including enhancement of circulation and digestive function. In contrast, herbs used exclusively by experts may represent more recent or region-specific adaptations developed in response to clinical experience or changing health needs related to lactation.

A comparative analysis between expert-reported and scripture-based formulations revealed both overlapping and distinct herbal compositions. Among the eleven overlapping herbs, most shared herbs were categorized as hot-taste herbs such as *Zingiber officinale* Roscoe., *Piper retrofractum* Vahl., and *Cyperus rotundus* L., which correspond to the Thai traditional medicine principle of stimulating the fire element and enhancing blood and wind circulation. These herbs were consistently cited for improving milk flow and relieving obstruction, which aligns with the scripture's therapeutic focus on purification and milk transformation (*Prasa Nam Nom*). In contrast, certain expert formulas included unique herbs such as *Iresine herbstii* Hook. and *Ardisia elliptica* Thunb., which are not mentioned in the *Prathom-Jinda* Scripture. The inclusion of these herbs may reflect regional adaptations or contemporary integration of local herbal knowledge into clinical practice. Therefore, the similarities in core herbal ingredients demonstrate the continuity of classical Thai traditional medicine principles, while the differences highlight its dynamic nature—where practitioners adjust formulas to suit the patient's elemental constitution, local herb availability, and modern health conditions.

The network suggests a layered therapeutic rationale in Thai traditional medicine: restoring elemental balance, cleansing/nourishing the system, and finally enhancing milk production. The convergence of both traditional and practitioner-derived evidence in the galactagogue cluster supports their core role in lactation care. Meanwhile, expert-unique purifier/nourishment herbs highlight clinical adaptation to modern maternal health needs.

The limitation of this study is its narrow sample scope, as interviews were conducted exclusively with experts from the Center of Applied Thai Traditional Medicine, Faculty of Medicine, Siriraj Hospital. While these practitioners are highly experienced and widely respected in the field, the herbal practices identified in this study may not fully represent those used throughout Thailand. Regional differences in herb availability and individual practitioner expertise can significantly influence recipe selection and application. Additionally, because the findings rely on expert interviews, the potential for recall bias and cognitive bias must be acknowledged, as individual memory, clinical habits, and personal beliefs may shape the information provided. Future research should therefore include practitioners from multiple

geographical regions and consider methodological approaches that minimize memory-dependent and perception-based biases to enhance the generalizability and robustness of the findings.

This study also sheds light on the primary causes and symptoms of lactation-related problems as addressed through herbal remedies, based on the perspectives of experienced practitioners. Furthermore, it identifies the most frequently used herbal formulations in contemporary clinical practice. The comparison between modern expert practices and traditional scripture-based formulations reveals both commonalities and variations in therapeutic goals and herbal composition. These findings provide important insights into the evolving role of Thai Traditional Medicine in postpartum care. The study also offers a basis for developing preliminary clinical guidelines for the use of herbal formulations in lactating women and for designing future studies to evaluate the efficacy of individual formulations. These advancements will be useful for developing evidence-based clinical practice for postpartum women.

Conclusion

This study demonstrates that Thai Traditional Medicine experts evaluate insufficient lactation through a combination of dietary patterns, breastfeeding behaviors, and observable milk characteristics, and employ a range of herbal formulations to support milk production. The comparison with the *Prathom-Jinda* scripture indicates both shared ingredients and unique adaptations in contemporary practice, reflecting continuity and contextual evolution of traditional knowledge. These findings provide a foundation for developing preliminary guidelines on herbal use in lactating women and highlight the need for future clinical studies, including randomized controlled trials, to evaluate the efficacy of specific formulations and to advance evidence-based postpartum care.

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