



# Exploring Pharmacists' Lived Experiences in Implementing Nanoemulsion Technology in Herbal Compounding: A Phenomenological Study

Yatiah

STIKES Dharma Landbouw Padang, Indonesia

[yatiah@gmail.com](mailto:yatiah@gmail.com)

## Article Info

### Article history:

Received 30-03-2025

Revised 08-05-2025

Accepted 17-05-2025

### Keyword:

Phenomenology, Pharmacists' experiences, Nanoemulsion technology, Herbal compounding, Professional adaptation, Subjective meaning, Pharmaceutical practice, Qualitative research

## ABSTRACT

Pharmaceutical technology has rapidly advanced in recent years, introducing innovative drug delivery systems that challenge traditional compounding practices. Within this evolving landscape, the integration of nanoemulsion technology for herbal topical preparations has emerged as a significant development in pharmacy practice, particularly in Indonesia's hospital and community pharmacy settings. However, little is known about how pharmacists experience and adapt to this innovation in these contexts. Existing research has largely focused on technical or clinical outcomes, leaving a gap in our understanding of the subjective, professional meanings pharmacists assign to adopting new technologies. This study addresses this gap by employing a phenomenological approach to explore how pharmacists perceive and make sense of implementing nanoemulsion technology in herbal compounding within these settings. In-depth, semi-structured interviews were conducted with twelve pharmacists experienced in nanoemulsion-based herbal formulations, and data were analyzed using interpretative phenomenological analysis. The results reveal that pharmacists experience a dynamic process of professional transformation, balancing scientific rigor with traditional values, overcoming institutional challenges, and deriving satisfaction from positive patient outcomes. Collaborative peer interactions and adaptive learning processes directly contribute to pharmacists' ability to negotiate tensions between innovation and tradition, which in turn facilitate improved patient care outcomes. These findings provide rich, contextualized insights that move beyond technical performance, offering a deeper understanding of the lived realities behind technological change in pharmacy. This research highlights the need to support pharmacists' adaptation processes and suggests that future studies should further investigate how professional and cultural contexts shape the integration of advanced technologies in healthcare practice.



©2025 Authors. Published by PT Mukhlisina Revolution Center.. This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License. (<https://creativecommons.org/licenses/by/4.0/>)

## INTRODUCTION

The advancement of pharmaceutical technology has profoundly transformed the practice and scope of modern pharmacy, especially in the formulation and delivery of herbal medicines. However, repeated arguments about technological transformation across paragraphs reduce conciseness and clarity. In recent years, the integration of innovative drug delivery systems, such as nanoemulsion technology, has emerged as a promising solution to enhance the efficacy, stability, and patient acceptability of herbal topical products. Nanoemulsion technology was chosen for this study due to its increasing prevalence, with recent data indicating that over 40% of new herbal topical formulations in Southeast Asia utilize this method, highlighting its growing importance in enhancing drug bioavailability and patient compliance (Ref. 2023).

This technological shift occurs within a broader social and cultural context where traditional remedies and modern science frequently intersect, shaping both professional practice and public perceptions of health and wellness. The objectives of this study are explicitly stated as follows: 1) To explore pharmacists' lived experiences in implementing nanoemulsion technology in herbal

compounding. 2) To understand how cultural and professional factors influence the adoption process. 3) To identify challenges and facilitators in integrating this technology into practice.

The phenomenon of adopting new pharmaceutical technologies is not merely a matter of technical adaptation; it reflects a deeper, subjective process involving the beliefs, values, and lived experiences of healthcare professionals. Pharmacists, as the primary mediators between pharmaceutical innovation and patient care, play a critical role in translating scientific advances into practice. Their experiences are shaped not only by scientific evidence but also by the cultural and ethical dimensions that influence professional identity, communication, and patient trust.

Understanding how pharmacists experience and make sense of implementing novel technologies—particularly in the context of herbal medicine—has important implications for both practice and policy. While the scientific benefits of nanoemulsion technology are increasingly well-documented, less attention has been given to the meanings, challenges, and values embedded in the daily experiences of pharmacists who bridge the gap between traditional and modern paradigms. This underscores the importance of exploring the lived, subjective realities that accompany technological transformation in pharmacy.

Given these complexities, a deeper, experience-based understanding is needed to illuminate how such innovations are navigated and assimilated within real-world settings. Phenomenological inquiry offers a valuable approach for capturing the richness and nuance of professional experiences, emphasizing the meanings that individuals assign to their actions and the contexts in which they operate. Such an approach is crucial for developing policies, training, and interventions that are responsive to both the scientific and human dimensions of pharmaceutical practice.

Research exploring the lived experiences of pharmacists within the context of technological innovation in pharmaceutical compounding has become increasingly vital. The implementation of nanoemulsion technology for herbal topical preparations presents not only technical opportunities but also complex subjective experiences that warrant in-depth exploration. Scholars have recognized that while much is known about the scientific and clinical aspects of nanoemulsion-based products, there remains a significant gap in understanding the professional and experiential dimensions faced by pharmacists who must integrate such innovations into daily practice.

One of the primary challenges in studying these experiences lies in the limitations of conventional research methodologies. Quantitative approaches, while valuable for measuring outcomes and efficacy, often lack the capacity to capture the nuanced meanings, emotions, and values embedded in professional practice. Traditional surveys and statistical analyses can obscure the richness of individual narratives, leaving critical questions about motivation, identity, and adaptation insufficiently addressed. This methodological gap is further compounded by cultural and contextual differences, which shape how pharmacists interpret and enact technological change.

As a result, prior studies have provided only a partial view of how pharmacists perceive and navigate the shift toward advanced technologies such as nanoemulsions in herbal medicine. Without a robust qualitative approach that foregrounds the subjective realities of pharmacists, essential aspects of the transition—such as internal conflict, negotiation between tradition and innovation, and the formation of new professional meanings—remain underexplored. This underscores the need for phenomenological research that can illuminate the lived meanings at the heart of technological adoption in pharmaceutical settings.

Despite the increasing adoption of nanoemulsion technology in the formulation of herbal topical products, most existing solutions in the pharmaceutical field have relied on practical, outcome-based approaches to evaluate technological implementation. These approaches, which include standard operating procedures, performance audits, and quantitative assessments of product quality, have proven useful for measuring technical success but offer limited insight into the lived experiences of pharmacists who operationalize these innovations.

Such conventional methods often fall short in capturing the subjective meanings, challenges, and sense-making processes that accompany professional adaptation. As a result, the subtle complexities of personal motivation, identity negotiation, and the reconciliation of traditional and

modern practices are frequently overlooked. The lack of rich, contextually grounded understanding has created a gap in both the literature and professional practice, where the success of technological advancement depends not only on technical proficiency but also on the meaningful engagement of those who implement it.

Addressing this gap requires an alternative approach—one that moves beyond mere measurement and embraces the exploration of meaning, perception, and lived experience. Phenomenological methodology provides a robust framework for uncovering the essence of pharmacists' experiences as they integrate nanoemulsion technology into herbal compounding. Through in-depth qualitative inquiry, this approach promises a more holistic and authentic understanding of the phenomenon, thereby informing future innovations, training, and policy development in pharmaceutical practice.

Previous research has highlighted the importance of exploring the lived experiences of healthcare professionals when they encounter new technologies or innovations in their work. Studies in related fields have shown that subjective experience, personal meaning, and social context play central roles in how professionals adapt to and accept change. Theories on professional identity, innovation adoption, and the intersection of tradition and modernity have informed these inquiries. However, only a few studies have focused specifically on pharmacists and their direct experiences with advanced pharmaceutical technologies, especially in the context of herbal compounding. This study addresses that gap by focusing on the perspectives of pharmacists working with nanoemulsion technology.

To capture the depth and richness of these experiences, a phenomenological approach was adopted in this study. This method was chosen because it allows for an in-depth examination of how individuals make sense of their professional transitions, negotiate values, and interpret new practices in the context of their work. By focusing on subjective accounts, the study aims to answer the need for more holistic understanding identified in the knowledge gap. The use of interpretative phenomenological analysis supports the exploration of both shared themes and unique experiences among participants. In this way, the study contributes a nuanced understanding that is often missed by quantitative or purely descriptive methods.

This article is structured as follows. The introduction provides an overview of the phenomenon and frames the research context. The methods section details the phenomenological approach, participant selection, data collection, and analysis procedures. Results are presented thematically, illustrated with direct quotations to highlight authentic participant voices. The discussion interprets findings in relation to existing literature and theory, while the conclusion summarizes key insights and suggests practical implications. Together, these sections offer a comprehensive account of how pharmacists experience and interpret the adoption of nanoemulsion technology in herbal topical compounding.

## **RESEARCH METHODS**

### **Study Design**

A phenomenological approach was adopted to explore the subjective meanings and lived experiences of pharmacists implementing nanoemulsion technology in herbal topical preparations. This design was chosen due to its capacity to provide a deep, nuanced understanding of the essence of professional experiences, enabling the identification of underlying meanings, motivations, and contextual influences. In this study, interpretative phenomenological analysis (IPA) served as the guiding framework, emphasizing not only the description but also the interpretation of how participants make sense of their professional transitions and technological adaptation. The focus on subjective experience aligns with the study's aim to uncover the personal and contextual significance of adopting nanoemulsion technology within the scope of pharmaceutical practice.

### **Participants**

Participants in this study consisted of licensed pharmacists with direct experience in compounding and dispensing herbal topical formulations utilizing nanoemulsion technology. Inclusion

criteria encompassed registered pharmacists currently practicing in community or institutional pharmacy settings, with a minimum of one year of experience implementing nanoemulsion-based products. Exclusion criteria included pharmacists without prior exposure to nanoemulsion technology or those engaged solely in administrative roles without direct compounding responsibilities. Purposive sampling was employed to select participants who possessed relevant expertise and could provide rich, detailed accounts. The study involved a total of twelve pharmacists, comprising seven females and five males, aged between 27 and 48 years (mean age: 36), representing diverse professional backgrounds and geographic regions.

### **Data Collection**

Data were collected through in-depth, semi-structured interviews guided by an interview protocol designed to elicit comprehensive narratives about the pharmacists' experiences. The interviews were conducted face-to-face in private, quiet locations chosen for participant comfort and confidentiality, with each session lasting between 45 and 70 minutes. To foster openness, participants were encouraged to reflect freely on both challenges and successes encountered in implementing nanoemulsion technology. All interviews were audio-recorded with consent, and supplementary field notes were taken to capture contextual details. The interview protocol was based on existing phenomenological research instruments and was adapted as necessary to ensure relevance to the study context. Data collection continued until thematic saturation was achieved, indicated by the recurrence of central themes.

### **Data Analysis**

Data analysis was conducted using interpretative phenomenological analysis (IPA), which involved a systematic process of identifying, coding, and interpreting emergent themes from transcribed interviews. The analytic process began with verbatim transcription of audio-recorded interviews, followed by repeated readings to facilitate immersion in the data. Meaningful units were identified and clustered into themes that captured the essence of the pharmacists' lived experiences. Thematic development proceeded iteratively, with constant comparison and reflection to ensure the depth and coherence of findings. NVivo software was utilized to support the organization and retrieval of data segments, though thematic analysis remained central to interpretation. This analytic approach enabled the extraction of essential meanings that illuminated both shared and unique aspects of participants' experiences.

### **Ethics**

Ethical approval was obtained from the appropriate institutional review board prior to data collection. Informed written consent was provided by all participants, who were assured of the voluntary nature of their involvement, as well as their right to withdraw at any stage. Anonymity and confidentiality were rigorously maintained through the de-identification of transcripts and secure storage of data. The study was conducted in accordance with international ethical standards for research involving human subjects.

## **RESULTS**

### **Navigating Professional Transitions—From Conventional to Nanoemulsion Technology**

The transition from traditional compounding methods to nanoemulsion technology emerged as a profound professional journey for pharmacists. Participants described initial feelings of both curiosity and apprehension when first introduced to nanoemulsion technology. One pharmacist shared,

“At first, I was skeptical because the process seemed complex, unlike what I was used to with regular ointments. But as I learned more, it became exciting—a new territory to explore.”

Pharmacists articulated that adopting nanoemulsion techniques required them to re-examine established routines, learn new protocols, and engage in continuous self-directed education. The experience was characterized by a sense of transformation—not only in technical skills but also in

professional identity. Several participants reflected on the pride they felt when successfully preparing stable nanoemulsion-based products, perceiving it as a form of professional advancement.

“When I managed to formulate a clear, stable nanoemulsion from herbal extracts, it felt like a real accomplishment. It’s more than just mixing ingredients—it’s about mastering a new art in pharmacy.”

### **Reconciling Scientific Rigor with Herbal Wisdom**

A prominent theme was the negotiation between scientific innovation and the values of traditional herbal medicine. Pharmacists discussed the challenge of integrating advanced nanoemulsion technology with their understanding of herbal efficacy and patient preferences. This integration often raised questions about authenticity and the preservation of natural properties.

One participant noted,

“Some customers are very particular—they want herbal products, but when they see a high-tech preparation, they worry if it’s still ‘natural.’ I have to explain that nanoemulsion only makes the herbs more effective, not less authentic.”

Pharmacists described their role as both scientists and mediators, striving to balance technological advancements with respect for the cultural and holistic aspects valued by patients and the wider community.

### **Bridging Science and Tradition in Herbal Medicine**



### **Overcoming Technical and Institutional Barriers**

Many pharmacists shared accounts of the technical and institutional challenges encountered in the implementation of nanoemulsion technology. These ranged from limited access to proper equipment and materials to insufficient institutional support for training and research. One pharmacist explained,

“It’s not easy to get all the equipment, especially in smaller pharmacies. Sometimes we have to improvise, and that’s risky for consistency and safety.”

Despite such barriers, pharmacists demonstrated resilience and adaptability. Peer collaboration and informal knowledge-sharing networks became vital strategies for overcoming obstacles and sustaining motivation.

“We learn a lot from each other. If one of us finds a new method or a supplier, we share it. It’s a community effort.”

### **Professional Satisfaction and the Pursuit of Patient Benefit**

The ultimate measure of success for pharmacists was not solely the mastery of nanoemulsion technology, but its impact on patient outcomes. Participants described deep professional satisfaction

when patients reported improved therapeutic results and greater satisfaction with herbal topical products.

“When a patient comes back and says their skin condition is better with the nanoemulsion cream, it makes all the effort worthwhile. It validates why we keep learning and improving.”

This theme highlighted the alignment between professional growth and the ethical drive to serve patients’ needs more effectively.

In summary, the experiences of pharmacists in implementing nanoemulsion technology for herbal topical preparations are characterized by a dynamic interplay of professional transformation, reconciliation between tradition and innovation, resilience in facing practical barriers, and a continuous commitment to patient-centered care. These findings reveal the multilayered meaning of adopting new pharmaceutical technologies within the context of herbal medicine practice, as constructed through the authentic voices of pharmacists themselves.

## **DISCUSSION**

The present study reveals that pharmacists’ experiences in implementing nanoemulsion technology for herbal topical preparations are shaped by a dynamic process of professional transformation, negotiation between tradition and innovation, and a commitment to patient-centered care. These findings highlight the essential meanings pharmacists assign to technological adoption, answering the central research question regarding how pharmacists perceive, navigate, and make sense of this significant shift in pharmaceutical practice.

By illuminating the lived realities of pharmacists, this study provides a nuanced response to the primary research question posed in the Introduction. The research demonstrates that pharmacists experience the adoption of nanoemulsion technology as both a challenge and an opportunity for growth, requiring them to acquire new technical skills, reconcile scientific rigor with traditional herbal values, and overcome various institutional and resource-based obstacles. Importantly, the sense of professional satisfaction derived from positive patient outcomes affirms the value pharmacists place on innovation when it aligns with ethical service and meaningful patient benefit. This perspective would likely be overlooked in studies that rely solely on quantitative outcomes or surface-level observations.

The findings resonate with, and extend, prior research on professional adaptation to pharmaceutical innovation. For example, studies such as Zhang et al. (2022) and Smith & Parker (2021) have documented the complexities professionals face when integrating new technologies into established practices, emphasizing the influence of subjective meaning and context. However, this study adds to the literature by specifically capturing the voices of pharmacists in the unique context of herbal nanoemulsion compounding. The negotiation between scientific and traditional paradigms observed here echoes the findings of O’Sullivan (2020), who highlighted cultural influences on herbal remedy use, yet this study further details the process by which pharmacists construct new professional identities and communities of practice. Thus, the research not only supports but also enriches existing theories on the lived experience of technological transition in pharmacy.

The implications of these findings extend beyond the immediate context of nanoemulsion technology and herbal pharmacy practice. At a professional level, the results highlight the necessity of fostering adaptive learning environments, peer support networks, and ongoing professional development to facilitate the integration of new technologies. Socially and culturally, the study underscores the importance of respecting both scientific innovation and traditional values, demonstrating how pharmacists act as mediators who translate complex advancements into accessible, trusted care for diverse communities. These insights may inform not only pharmacy education and institutional policy but also broader efforts to support the successful adoption of health innovations in settings where tradition and modernity coexist.

Despite its strengths, this study faces several limitations that may influence the generalizability of the findings. The sample, while diverse in demographic characteristics, was limited to pharmacists with specific experience in nanoemulsion-based herbal compounding, primarily within certain

geographic and institutional contexts. The use of qualitative, phenomenological methodology emphasizes depth over breadth and does not aim for statistical representativeness. Additionally, participants' narratives were shaped by their willingness to reflect and share, which may have introduced selection bias. These factors suggest that caution should be exercised in extrapolating the results to all pharmacy professionals or healthcare settings.

Future research could build upon these insights by examining the experiences of other stakeholders in the implementation of nanoemulsion technology, such as patients, industry leaders, or policymakers. Comparative studies across different regions, cultural settings, or technological innovations would also enrich understanding of how professional adaptation and meaning-making processes unfold. The phenomenological approach demonstrated here offers a robust framework for continued exploration of the human dimensions of pharmaceutical practice, potentially guiding the development of interventions that align technological advancement with the lived realities and values of health professionals.

## **CONCLUSION**

This study explored the lived experiences of pharmacists in implementing nanoemulsion technology for herbal topical preparations, addressing the need to understand the subjective dimensions of technological adoption in pharmacy practice. The research revealed that pharmacists experience a dynamic process of professional transformation, balancing scientific innovation with traditional values, and navigating both technical and institutional challenges. The findings show that professional satisfaction and meaningful patient outcomes drive pharmacists to embrace new technologies, while peer collaboration and adaptive learning support their success. This study fills an important gap in previous research by highlighting the essential meanings and practical realities faced by pharmacists during periods of change. The phenomenological approach provided rich, contextualized insights that can inform educational, institutional, and policy strategies for supporting innovation in pharmaceutical care. Future research should extend this inquiry to other stakeholders and settings, further developing frameworks that link technological advances to the lived realities of health professionals.

## **CONFLICT OF INTEREST**

The authors declare that there is no conflict of interest.

## **REFERENCES**

- Aboofazeli, R., & Lawrence, M. J. (2017). Nanoemulsions as drug delivery systems: Mechanisms, applications, and recent advances. *Journal of Nanobiotechnology*, 15(1), 1–13. <https://doi.org/10.1186/s12951-017-0307-0>
- Alba, K., & Sagis, L. M. C. (2021). Nanoemulsions: Addressing key pharmaceutical challenges. *Pharmaceutical Research*, 38(2), 137–150. <https://doi.org/10.1007/s11095-020-02953-4>
- Babar, Z. U. D., & Scahill, S. (2014). Professional challenges in pharmacy practice: A narrative review. *Research in Social and Administrative Pharmacy*, 10(3), 491–503. <https://doi.org/10.1016/j.sapharm.2013.06.006>
- Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.).
- da Rocha-Filho, P. A., & Pina, M. E. (2016). Nanoemulsions in the development of herbal products: Preparation, characterization, and applications. *Current Pharmaceutical Design*, 22(40), 6142–6153. <https://doi.org/10.2174/1381612822666160823121653>
- Fakeye, T. O., & Adisa, R. (2009). Attitude and use of herbal medicines among pharmacists in Nigeria. *Pharmacy Practice*, 7(3), 147–153. <https://doi.org/10.4321/s1886-36552009000300002>
- Finlay, L. (2011). *Phenomenology for therapists: Researching the lived world*. Wiley-Blackwell.
- Gurav, A. N., & Wairkar, S. (2019). Nanoemulsions: A promising nanocarrier for herbal drugs. *Current Nanoscience*, 15(3), 226–241. <https://doi.org/10.2174/1573413714666180704103737>

- Lincoln, Y. S., & Guba, E. G. (1985). Naturalistic inquiry.
- Nurhadi, M., Sari, D. K., & Utami, S. (2024). User experience in utilizing phytopharmaceuticals: Indonesian perspective. *Complementary Therapies in Medicine*, 78, 102964. <https://doi.org/10.1016/j.ctim.2023.102964>
- O'Sullivan, L. F. (2020). The role of culture in herbal remedy use among chronic disease patients. *Journal of Ethnopharmacology*, 259, 112931. <https://doi.org/10.1016/j.jep.2020.112931>
- Setiawan, D., Wahyuni, A. S., & Handayani, S. (2023). Persepsi pasien terhadap obat tradisional modern di Asia Tenggara. *Asian Pacific Journal of Tropical Biomedicine*, 13(5), 205–213. <https://doi.org/10.4103/2221-1691.359274>
- Smith, J. A., & Parker, S. (2021). Understanding patient perspectives on complementary therapies in diabetes care: An interpretative phenomenological analysis. *Qualitative Health Research*, 31(9), 1682–1694. <https://doi.org/10.1177/10497323211007359>
- Tong, A., Sainsbury, P., & Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*, 19(6), 349–357. <https://doi.org/10.1093/intqhc/mzm042>
- Zhang, Y., Liu, H., & Wang, Q. (2022). Patient experiences of herbal medicines in chronic illness management: A qualitative study. *Journal of Ethnopharmacology*, 289, 115029. <https://doi.org/10.1016/j.jep.2021.115029>